48/50PG C03−14
48/50PM C16−28
Single Package Rooftop Units
With *COMFORT*Link™ Controls Version 5.x
and PURON® (R−410A) Refrigerant

Carrier®
Turn to the Experts℠

Controls, Start−Up, Operation, Service and Troubleshooting Instructions

IMPORTANT: This literature covers 48/50PG03−14 and 48/50PM16−28 models with Comfortlink Software version 5.x. The 48/50PG C16−28 (15 – 25 ton) model reference has been removed from this manual; however version 5.x software is backward compatible with all Comfortlink PG models. Refer to past manuals for obsolete model information.

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment. Untrained personnel can perform the basic maintenance functions of replacing filters. Trained service personnel should perform all other operations.

When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply. Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

Follow all safety codes. Wear safety glasses and work gloves. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety–alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety–alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lockout tag. Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may cause equipment damage.

This unit uses a microprocessor–based electronic control system. Do not use jumpers or other tools to short out components or to bypass or otherwise depart from recommended procedures. Any short–to–ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
What to do if you smell gas:
1. DO NOT try to light any appliance.
2. DO NOT touch any electrical switch, or use any phone in your building.
3. IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department.

GENERAL

This publication contains Start–Up, Controls, Operation, Service, and Troubleshooting information for the 48/50PG and 48/50PM rooftop units. (See Table 1.) These units are equipped with *Comfort*Link™ controls version 5.X or higher and use Puron® refrigerant. The specific base unit installation instructions and/or wiring label diagram may also be required in conjunction with this book as a guide to a specific unit on the roof. All the units in table 1 are Constant Volume (CV) units that provide stand–alone or network operation.

Table 1 – Rooftop Units

MODEL	SIZE	NOMINAL TONS
48/50PG	03	2
	04	3
	05	4
	06	5
	07	6
	08	7.5
	09	8.5
	12	10
	14	12.5
48/50PM	16	15
	20	18
	24	20
	28	25

BASIC CONTROL USAGE

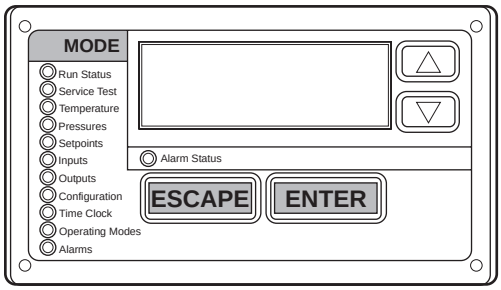
*Comfort*Link Control

The *Comfort*Link control is a comprehensive unit-management system. The control system is easy to access, configure, diagnose and troubleshoot.

The *Comfort*Link control is fully communicating and cable-ready for connection to the Carrier Comfort Network® (CCN) building management system. The control provides high-speed communications for remote monitoring via the Internet. Multiple units can be linked together (and to other *Comfort*Link control equipped units) using a 3-wire communication bus.

The *Comfort*Link control system is easy to access through the use of a unit-mounted display module. There is no need to bring a separate computer to this unit for start-up. Access to control menus is simplified by the ability to quickly select from 11 menus. A scrolling readout provides detailed explanations of control information. Only four, large, easy-to-use buttons are required to maneuver through the entire controls menu. The display readout is designed to be visible even in bright sunlight.

For added service flexibility, an accessory hand-held Navigator™ module is also available. This portable device has an extended communication cable that can be plugged into the unit's communication network at the main control box. The Navigator display provides the same menu structure, control access and display data as is available at the unit-mounted Scrolling Marquee display.



C06320

Fig. 1 – Scrolling Marquee

Scrolling Marquee

This device is the keypad interface used to access the control information, read sensor values, and test the unit. The Scrolling Marquee is located in the main control box and is standard on all units. The Scrolling Marquee display is a 4-key, 4-character, 16-segment LED (light-emitting diode) display module. The display also contains an Alarm Status LED. (See Fig. 1.)

The display is easy to operate using 4 buttons and a group of 11 LEDs that indicate the following menu structures:

- Run Status
- Service Test
- Temperatures
- Pressures
- Set points
- Inputs
- Outputs
- Configuration
- Timeclock
- Operating Modes
- Alarms

Through the Scrolling Marquee, the user can access all of the inputs and outputs to check on their values and status, configure operating parameters plus evaluate the current decision status for operating modes. The control also includes an alarm history which can be accessed from the display. In addition, through the Scrolling Marquee, the user can access a built-in test routine that can be used at start-up commissioning and to diagnose operational problems with the unit. (See Table 2.)

Accessory Navigator Display

The accessory hand-held Navigator display can be used with the 48/50PG and 48/50PM units. (See Fig. 2.) The Navigator display operates the same way as the Scrolling Marquee device. The Navigator display is plugged into the LEN (local equipment network) port on either TB1/TB2 or the J3 port on the ECB (economizer control board).

C06321

Fig. 2 – Accessory Navigator Display

Operation

All units are shipped from the factory with the Scrolling Marquee display, which is located in the main control box. (See Fig. 1.) In addition, the *Comfort*Link™ control also supports the use of the handheld Navigator display.

Both displays provide the user with an interface to the *Comfort*Link control system. The displays have up and down arrow keys, an ESCAPE key and an ENTER key. These keys are used to navigate through the different levels of the display structure. The Navigator display and the Scrolling Marquee operate in the same manner, except that the Navigator display has multiple lines of display and the Scrolling Marquee has a single line. All further discussions and examples in this document will be based on the Scrolling Marquee display. See Table 2 for the menu structure.

The four keys are used to navigate through the display structure, which is organized in a tiered mode structure. If the buttons have not been used for a period, the display will default to the AUTO VIEW display category as shown under the RUN STATUS category. To show the top-level display, press the ESCAPE key until a blank display is shown. Then use the up and down arrow keys to scroll through the top-level categories. These are listed in Appendix A and will be indicated on the Scrolling Marquee by the LED next to each mode listed on the face of the display.

When a specific mode or sub-mode is located, push the ENTER key to enter the mode. Depending on the mode, there may be additional tiers. Continue to use the up and down keys and the ENTER keys until the desired display item is found. At any time, the user can move back a mode level by pressing the ESCAPE key. Once an item has been selected the display will flash showing the item, followed by the item value and then followed by the item units (if any).

Items in the Configuration and Service Test modes are password protected. The display will flash PASS and WORD when required. Use the ENTER and arrow keys to enter the four digits of the password. The default password is 1111.

Pressing the ESCAPE and ENTER keys simultaneously will scroll an expanded text description across the display indicating the full meaning of each display point. Pressing the ESCAPE and ENTER keys when the display is blank (MODE LED level) will return the display to its default menu of rotating AUTO VIEW display items. In addition, the password will need to be entered again before changes can be made.

Changing item values or testing outputs is accomplished in the same manner. Locate and display the desired item. If the display is in rotating auto-view, press the ENTER key to stop the display at the desired item. Press the ENTER key again so that the item value flashes. Use the arrow keys to change the value of state of an item and press the ENTER key to accept it. Press the ESCAPE key and the item, value or units display will resume. Repeat the process as required for other items.

There are some points that can be forced from the Scrolling Marquee or the Navigator. If the user needs to force a variable, follow the same process as when editing a configuration parameter. A forced variable, regardless where the force has come from will be displayed with a blinking "." on a Scrolling Marquee and a blinking "f" on a Navigator following its value. For example, if economizer commanded position (EC.CP) is forced, the Navigator display shows "80f", where the "f" is blinking to signify a force on the point. The Scrolling Marquee display shows "80." Where the "." is blinking to signify a force on the point. Remove the force by selecting the point that is forced with the key ENTER and then pressing the up and down arrow keys simultaneously.

Depending on the unit model, factory-installed options and field-installed accessories, some of the items in the various Mode categories may not apply.

System Pilot™ and Touch Pilot Devices

The System Pilot device (33PILOT-01) and Touch Pilot device (33CNTPILOT) can be used as CCN communication user–interfaces. These devices can be put on the CCN bus and addressed to communicate with any other device on the network. Unlike the Scrolling Marquee and Navigator, these pilots read the unit's CCN tables and its CCN points can be monitored, forced, or configured. The Pilot devices can be used to install and commission a 3V zoning system, linkage compatible air source, universal controller, and all other devices operating on the Carrier communicating network.

Additionally, the System Pilot device can serve as a wall-mounted temperature sensor for space temperature measurement. The occupant can use the System Pilot device to change set points. A security feature is provided to limit access of features for unauthorized users. See Fig. 3 for System Pilot device details.

CCN Tables and Display

In addition to the unit–mounted Scrolling Marquee display, the user can also access the same information through the CCN tables by using the Service tool or other CCN programs/devices. The variable names used for the CCN tables and the Scrolling Marquee menus may be different and more items may be displayed in the CCN tables. Details on the CCN tables are included with the local display menus in Appendix A. Appendix A is structured towards the organization of the local display (Scrolling Marquee) menus. Because of the variety of CCN programs and devices, the CCN tables, sub–tables, and points are referenced within that organization.

Table 2 – Scrolling Marquee Mode and Menu Display Structure

RUN STATUS	SERVICE TEST	TEMPERATURES	PRESSURES	SETPOINTS	INPUTS	OUTPUTS	CONFIGURATION	TIME CLOCK	OPERATING MODES	ALARMS
Auto View of Run Status (VIEW) ↓ Software Version Numbers (VERS) ↓ Control Modes (MODE) ↓ Cooling Status (COOL) ↓ Heating Status (HEAT) ↓ Economizer Status (ECON) ↓ Outside Air Unit Status (OAU) ↓ Component Run Hours (HRS) ↓ Component Starts (STRT)	Service Test Mode (TEST) ↓ Test Independent Outputs (INDP) ↓ Test Fans (FANS) ↓ Test Cooling (COOL) ↓ Test Humidi-MiZer™ (HMZR) ↓ Test Heating (HEAT)	Air Temperatures (AIR.T) ↓ Refrigerant Temperatures (REF.T)			Thermostat Inputs (STAT) ↓ General Inputs (GEN.I) ↓ Current Sensor Inputs (CS.IN) ↓ Air Quality Inputs (AIR.Q)	Fan Outputs (FANS) ↓ Cool Outputs (COOL) ↓ Heat Outputs (HEAT) ↓ Economizer Outputs (ECON) ↓ Alarm Relay (ALRM)	Display Configuration (DISP) ↓ Unit Configuration (UNIT) ↓ Cooling Configuration (COOL) ↓ Humidi-MiZer™ Config. (HMZR) ↓ Heating Configuration (HEAT) ↓ Economizer Configuration (ECON) ↓ Air Quality Cfg. (AIR.Q) ↓ Outside Air Unit Configuration (OAU) ↓ Adaptive Fan Configuration (A.FN) ↓ Alarm Relay Config. (ALM.O) ↓ Sensor Calibration (TRIM) ↓ CCN Configuration (CCN)	Time of Day (TIME) ↓ Month, Date Day and Year (DATE) ↓ Daylight Savings Time (DST) ↓ Local Time Schedule (SCH.L) ↓ Local Holiday Schedules (HOL.L)	Control Modes (MODE) ↓ Cool Mode Diagnostic (COOL) ↓ Heat Mode Diagnostic (HEAT) ↓ Economizer Diagnostic (ECON) ↓ Outside Air Unit Diagnostic (OAU) ↓ Demand Listing (DMD.L)	Reset All Current Alarms (R.CURR) ↓ Reset Alarm History (R.HIST) ↓ Currently Active Alarms (CURR) ↓ Alarm HIstory (HIST)

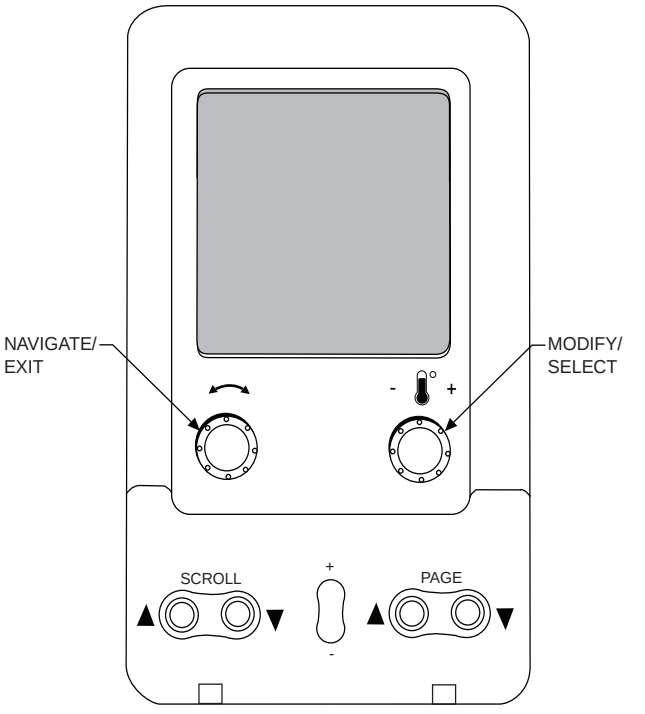


Fig. 3 – System Pilot™ User Interface

Force Hierarchy

There is a hierarchy in CCN with regards to forcing a point. Programs and devices write a force at different priority levels. A higher level (smaller number, 1 being the highest) will override a lower level force. The Scrolling Marquee uses a Control Force at level 7. The Navigator writes a Service Force which is level 3. System Pilots and Touch Pilots write Supervisor Forces at level 4. Network programs can be set to write different level priority forces.

Generic Status Display Table

The GENERIC points table allows the service/installer the ability to create a custom table in which up to 20 points from the 5 CCN categories (Points, Config, Service–Config, Set Point, and Maintenance) may be collected and displayed.

In the Service–Config table section, there is a table named "GENERICS." This table contains placeholders for up to 20 CCN point names and allows the user to decide which points are displayed in the GENERIC points sub–table under the status display table. Each one of these placeholders allows the input of an 8–character ASCII string. Using a CCN interface, enter the Edit mode for the Service–Config table "GENERICS" and enter the CCN name for each point to be displayed in the custom points table in the order they will be displayed. When done entering point names, download the table to the rooftop unit control.

IMPORTANT: The computer system software (ComfortVIEW™, Service Tool, etc.) that is used to interact with CCN controls, always saves a template of items it considers as static (e.g., limits, units, forcibility, 24–character text strings, and point names) after the software uploads the tables from a control. Thereafter, the software is only concerned with run time data like value and hardware/force status. With this in mind, it is important that anytime a change is made to the Service–Config table "GENERICS" (which in turn changes the points contained in the GENERIC point table), that a complete new upload be performed. This requires that any previous table database be completely removed first. Failure to do this will not allow the user to display the new points that have been created and the CCN interface will have a different table database than the unit control.

Conventions Used in This Manual

The following conventions for discussing configuration points for the local display (Scrolling Marquee or Navigator™ accessory) will be used in this manual.

Point names will be written with the Mode name first, then any submodes, then the point name, each separated by an arrow symbol (→). Names will also be shown in bold and italics. As an example, the Thermostat Control Type which is located in the Configuration mode, and Unit sub-mode would be written as ***Configuration→ UNIT→T.CTL.***

This path name will show the user how to navigate through the local display to reach the desired configuration. The user would scroll through the modes and sub-modes using the up and down keys. The arrow symbol in the path name represents pressing ENTER to move into the next level of the menu structure.

When a value is included as part of the path name, it will be shown at the end of the path name after an equals sign. If the value represents a configuration setting, an explanation will be shown in parenthesis after the value. As an example, ***Configuration→UNIT→T.CTL* = 1** (1 Stage Y1).

Pressing the ESCAPE and ENTER keys simultaneously will scroll an expanded text description of the point name across the display. The expanded description is shown in the local display tables but will not be shown with the path names in text.

The CCN point names are also referenced in the local display tables for users configuring the unit with CCN software instead of the local display. See Appendix A of this manual.

START-UP

IMPORTANT: Do not attempt to start unit, even momentarily, until all items on the Start−Up Checklist (last page) and the following steps have been read/completed.

Unit Preparation

Check that unit has been installed in accordance with these installation instructions and all applicable codes.

Compressor Mounting

Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

Refrigerant Service Ports

Each independent refrigerant system has a total of 3 Schrader-type service gauge ports per circuit. One port is located on the suction line, one on the compressor discharge line, and one on the liquid line. Be sure that caps on the ports are tight.

Crankcase Heater(s)

Compressor crankcase heater operation varies depending on the unit size and type. In general for all units, the crankcase heaters are energized if there is power to the unit, the compressor is not operating, and the ambient temperature is below 75°F.

IMPORTANT: Unit power must be on for 24 hours prior to start−up. Otherwise, damage to compressor may result.

Compressor Rotation

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in unit damage.

Improper wiring will cause compressor stoppage and alarm. Correct wiring by switching leads as indicated below.

On 3-phase units, it is important to be certain the compressors are rotating in the proper direction. To determine whether or not compressors are rotating in the proper direction, use a phase-rotation meter on the unit input power to check for L1-L2-L3 or clockwise rotation or use the Service Test mode to energize a compressor. If the compressor is rotating in the wrong direction, the controls will stop the compressor and display alarm for “Circuit x Failure to Pressurize,” where x is the corresponding A, B or C compressor circuit.

NOTE: Indoor or outdoor fan rotation direction may not indicate proper input power phase sequence, as some 3-phase units use single-phase fan motors.

To correct the wrong compressor rotation direction, perform the following procedure:

1. Turn off power to the unit and lock out the power.
2. Switch any two of the incoming unit power leads.
3. Turn on power to the unit.
4. Verify corrected compressor rotation.

Power Supply

All 208/230-v units are factory wired for 230-v power supply. If the 208/230-v unit is to be connected to a 208-v power supply, the transformers (TRAN1, TRAN2 and TRAN3) must be rewired by moving the wire from the 230-volt connection and moving to the 200-volt terminal on the primary side of the transformer. Refer to unit label diagram for additional information.

Internal Wiring

Check all electrical connections in unit control boxes; tighten as required.

Evaporator Fan

Fan belt and variable pulleys are factory−installed, but may need to be adjusted for specific applications. Be sure that the fans rotate in the proper direction. See Appendix C for unit specific fan performance data. See Appendix D for unit specific air quality limits, evaporator fan motor specifications, FIOP static pressures, and fan RPM for various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment in the Service section.

NOTE: Units equipped with Adaptive Fan still must conform to minimum CFM requirements at all times and the fan speed configurations must be set for this compliance.

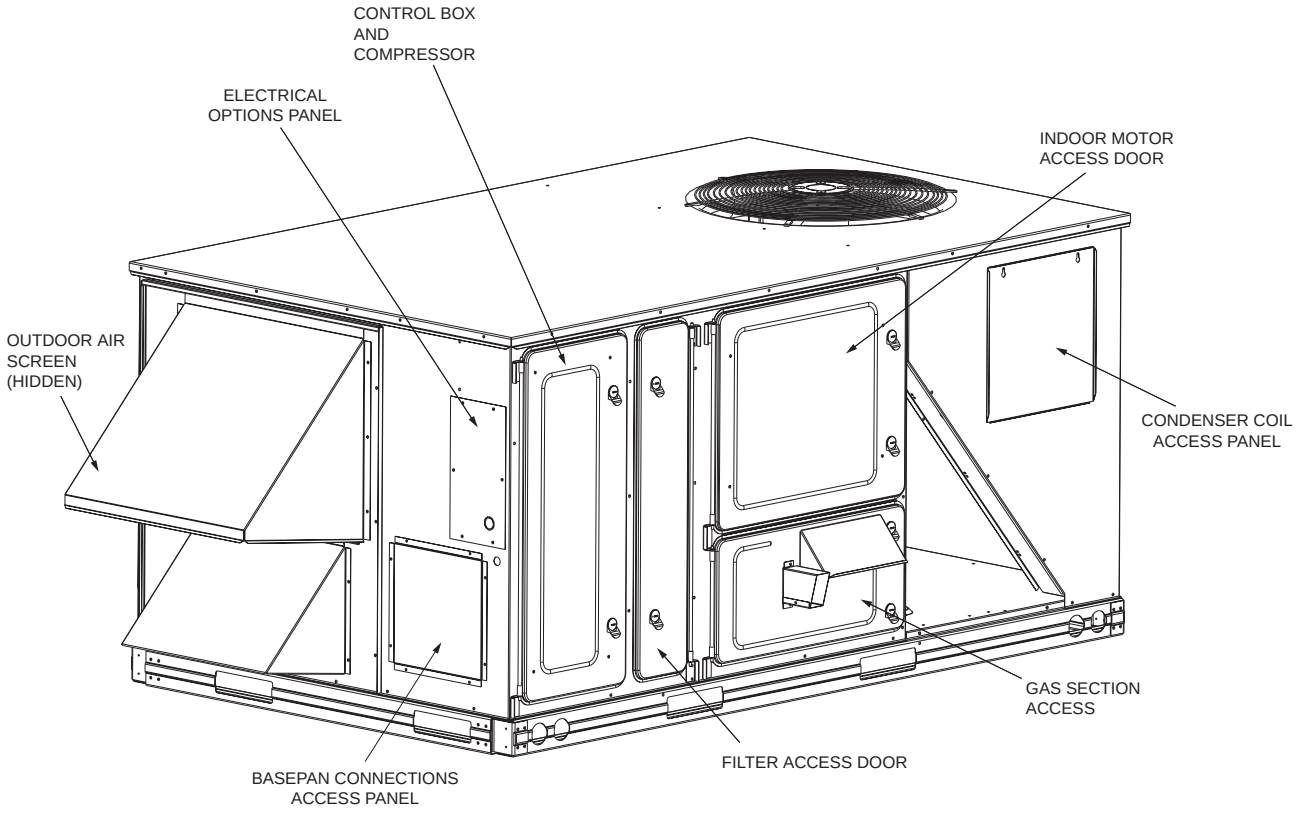


Fig. 4 – 48/50PG03–14 Size Units, Panel and Filter Locations (48PG03–07 Unit Shown)

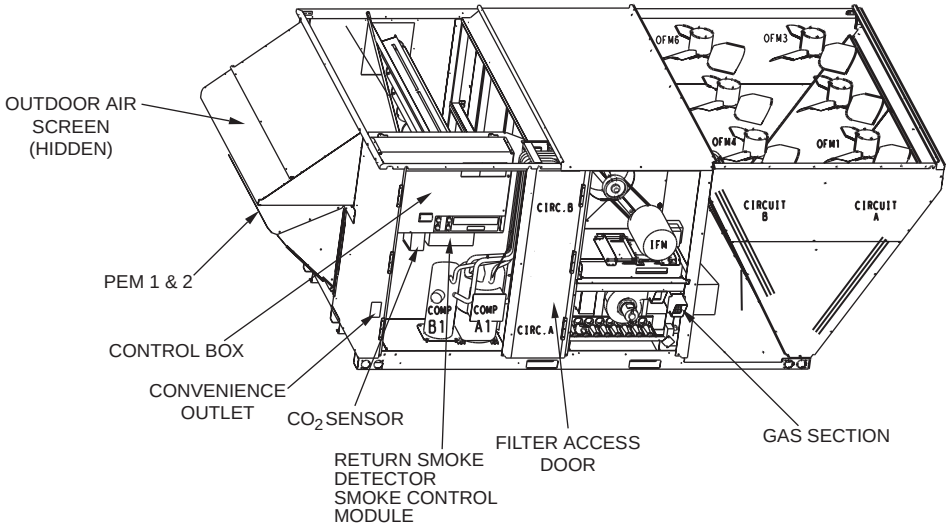


Fig. 5 – 48/50PM16–28 Size Units, Panel and Filter Locations (48PM24 Unit Shown)

Condenser Fans and Motors

Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section as required.

Return−Air Filters

Check that correct filters are installed in filter tracks (see Physical Data table in Installation Instructions). Do not operate unit without return-air filters.

NOTE: For units with 4-in. filter option, units are shipped with standard 2-in. filters. To install 4-in. filters, the filter spacers must be removed.

Outdoor−Air Inlet Screens

Outdoor-air inlet screens must be in place before operating unit.

Air Baffles

Units with Humidi-MiZer™ option are equipped with Motormaster® control to maintain adequate discharge pressure for proper unit operation during low ambient operation. Field-fabricated and installed wind baffles may be required. See Optional Humidi-MiZer™ Dehumidification System section.

Accessory Installation

Check to make sure that all accessories including space thermostats and sensors have been installed and wired as required by the instructions and unit wiring diagrams.

Orifice Change (48PG and 48PM)

This unit is factory assembled for heating operation using natural gas at an elevation from sea level to 2000 ft.

Use accessory high altitude kit when installing this unit at an elevation of 2000 to 7000 ft. For elevations above 7000 ft, refer to High Altitude section to identify the correct orifice size for the elevation. Purchase these orifices from your local Carrier dealer. Follow instructions in accessory Installation Instructions to install the correct orifices.

Use accessory LP (liquid propane) gas conversion kit when converting this unit for use with LP fuel usage for elevations up to 7000 ft. For elevations above 7000 ft, refer to High Altitude section to identify the correct orifice size for the elevation. Purchase these orifices from your local Carrier dealer. Follow instructions in accessory Installation Instructions to install the correct orifices.

Gas Heat (48PG and 48PM)

Inspect the gas heat section of the unit. Verify the number of burners match the number of heat exchanger openings and the burner assembly is properly aligned. If the orifices were changed out for elevation or Liquid Propane purposes, verify proper installation. Visually inspect other components in heat section.

Verify gas pressures before turning on heat as follows:

1. Turn off field-supplied manual gas stop, located external to unit.
2. Connect pressure gauge to supply gas tap, located on field-supplied manual shutoff valve. (See Fig. 6.)
3. Connect pressure gauge to manifold pressure tap.
4. Turn on field-supplied manual gas stop. Enter Service Test mode by setting ***Service Test→TEST*** to "ON" using the Scrolling Marquee display. Temporarily install the jumper wire between "R" and "W1" on TB1. Use the Service Test feature to set ***Service Test→HEAT→HT.1*** to ON (first stage of heat) using the Scrolling Marquee.

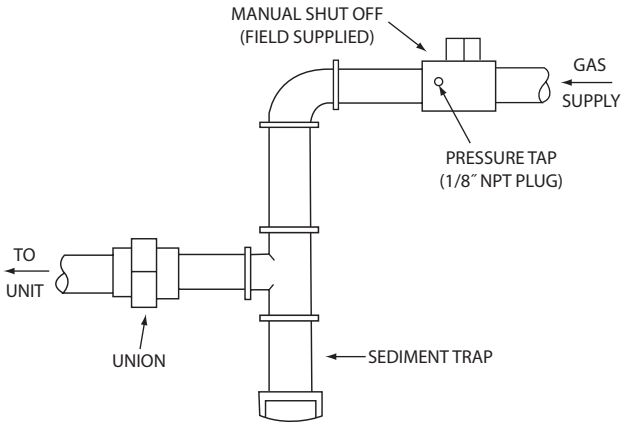


Fig. 6 – Field Gas Piping

5. After the unit has run for several minutes, verify the supply gas pressure is between 5.5−in. wg to 13.0−in. wg, and the manifold pressure is 3.50−in. wg on sizes 03−14, 3.00−in.wg on sizes 16−28 with a vertical supply or 2.95−in.wg on sizes 16−28 with a horizontal supply. If manifold pressure must be adjusted, refer to Gas Valve Adjustment section.

NOTE: Supply gas pressure must not exceed 13.0−in. wg.

6. Set ***Service Test→HEAT→HT.1*** to OFF using Scrolling Marquee.
7. Remove jumper wire if the unit will be operating under thermostat mode. The jumper must remain if a space temperature sensor (T-55, T-56, T-58, or System Pilot™ device) will control the unit.
8. Exit Service Test mode by setting ***Service Test→TEST*** to "OFF" using the Scrolling Marquee.

EnergyX

For units equipped with the EnergyX factory installed option, there is an EnergyXv2 Supplement Installation Instructions in the unit's information packet. Follow the start up sequence and complete the start up checklist contained in the EnergyXv2 manual to complete unit startup.

CONTROLS QUICK SET−UP

The following information will provide a quick guide to setting up and configuring the 48/50PG and 48/50PM series units with *Comfort*Link™ controls. Unit controls are pre-configured at the factory for factory-installed options. Field-installed accessories will require configuration at start-up. Service Test is recommended for initial start−up. Additionally, specific job requirements may require changes to default configuration values. See the CCN and Display parameter tables and other sections of these instructions for more details. Refer to the Major System Components or accessory installation instructions for specific wiring detail.

Control Set Point and Configuration Log

During start up, accessory installation, and equipment service set points and/or configuration changes might have to be made. When setting set points or changing configuration settings, documentation is recommended. The Control Log starting on page 192 should be filled out and left with the unit at all times, a copy should also be provided to the equipment owner.

Thermostat Control

Wire accessory thermostat to the corresponding R, Y1, Y2, W1, W2, and G terminals on the field connection terminal board located at the unit control box.

The Unit Control Type configuration, ***Configuration →UNIT→U.CTL,*** default value is for Thermostat (2) so there is no need to configure this item.

The Thermostat Control Type, ***Configuration →UNIT→T.CTL,*** selects the unit response to the thermostat inputs above.

Space Temperature Sensor Control – Direct Wired (T–55 or T–56 or T–59)

Wire accessory space temperature sensor(s) to the T-55 terminals on the field connection terminal board located at the unit control box. Refer to Field-Installed Accessories section for additional information.

The Unit Control Type configuration, ***Configuration →UNIT→U.CTL***, must be set to Space Sensor (3). The jumper wire in the installer's packet must be connected between R and W1 for heating mode to operate.

T–58 Communicating Room Sensor

Install the T-58 communicating thermostat. Connect the CCN communication bus from the T-58 to the CCN terminals on the field connection terminal board located at the unit control box. Configure the unit's CCN communication element number, bus number, and baud rate. Configure the T–58's CCN communication bus number and baud rate the same as the unit, while the element number has to be different. Configure the T–58 to send SPT to the unit's element number. Refer to the Field–Installed Accessories section for additional information.

The Unit Control Type configuration, ***Configuration →UNIT→U.CTL***, must be set to Space Sensor (3). The jumper wire in the installer's packet must be connected between R and W1 for heating mode to operate.

CCN Linkage Control

The CCN communication must be properly configured for the 48/50PG and 48/50PM units and all other devices. Linkage configuration is automatically done by the supervisory CCN Linkage device.

The Unit Control Type configuration, ***Configuration →UNIT→U.CTL*** must be set to Space Sensor (3). The jumper wire in the installer's packet must be connected between R and W1 for heating mode to operate.

Installation of an accessory supply air temperature (SAT) sensor in the supply duct is recommended for Linkage applications. A supply duct SAT measurement is valid for heating mode display, while the factory-standard internal SAT is not valid for heating due to its location upstream of the heating section. When installing the supply duct SAT, the heating mode display is enabled by setting ***Configuration→HEAT→SAT.H*** to ENBL.

Installation of an accessory return air temperature (RAT) sensor in the return duct and wired to the space sensor input is recommended for Linkage applications. This will allow the unit to continue to run if Linkage communication is lost.

System Pilot – Communication Space Sensor

Install the System Pilot and connect the CCN communication bus from it to the unit's CCN connection on the low voltage terminal board. Configure the unit's CCN communication element number, bus number, and baud rate. Refer to the System Pilot's installation instructions for configuring it to be used as a space temperature and attaching it to a unit.

Thermidistat Control

The thermidistat is a thermostat and humidistat combined and the inputs are provided on the field connection terminal board. The unit control type configuration, ***Configuration→UNIT→U.CTL***, default value is for thermostat (2) so there is no need to configure this item. The thermostat control type configuration, ***Configuration→UNIT→T.CTL***, selects the unit response to the thermostat inputs above. The space humidity switch configuration, ***Configuration→UNIT→RH.SW***, identifies the normally open or normally closed status of this input at LOW humidity, and the input is the Humidistat 1 terminal (only on Humidi-MiZer™ units).

Space Humidistat Control

For units with the factory Humidi-MiZer™ option, the humidistat input is provided on the field connection terminal board. The Space Humidity Switch configuration, ***Configuration→UNIT→RH.SW***, identifies the normally open or normally closed status of this input at LOW humidity. Humidistat 2 terminal is the 24 VAC source for dry contact and the Humidistat 1 terminal is the signal input.

NOTE: On units with Humidi-MiZer™, the Humidistat terminals 1 and 2 are the same as the Fire Shutdown terminals 1 and 2 on a standard unit. See Fire Shutdown section.

Relative Humidity Sensor Control

For units with the factory installed Humidi-MiZer™ option and the economizer option (with the ECB–economizer control board), the humidity sensor input is provided on the field connection terminal board (TB1/TB2). The sensor can be used in addition to or instead of a humidistat or thermidistat. The RH Sensor on OAQ Input configuration, ***Configuration→UNIT→RH.S=YES***, identifies that the sensor is being used instead of an OAQ sensor. Adjust RH setpoints as needed. Terminal 1 is the 24vdc loop power and Terminal 4 is the 4–20 mA signal input. Refer to the Field Installed Accessories and Humidi-MiZer™ Operation sections for more information.

CCN Communication

Configure ***Configuration→CCN→CCN.A*** to desired element number. (Default is 1.) Configure ***Configuration→CCN→ CCN.B*** to desired bus number. (Default is 0.) Configure ***Configuration→CCN→BAUD*** to desired code number for baud rate (Default is 3 = 9600 baud).

Accessories

Below are quick configuration settings for field installed accessories. If these accessories were installed by the factory, they will already be configured. See the Field–Installed Accessories section, third party control, control connection tables, and CCN or Display parameter tables for any accessories not mentioned below and any additional information on accessories.

Economizer

If an Economizer accessory was field installed, the unit must be configured for it by setting ***Configuration→ECON→EC.EN*** to YES. The default settings for the other economizer configurations should be satisfactory. If they need to be changed, additional information about these configuration settings can be found in the Economizer section.

Power Exhaust

If a Power Exhaust accessory was field installed, the unit must be configured for it by setting ***Configuration→ECON→PE.EN*** to ENBL. The default settings for the other power exhaust configurations should be satisfactory. If they need to be changed, additional information about these configurations can be found in the Power Exhaust section.

Electric Heat

If an Electric Heat accessory was field installed, the unit must be configured for it by setting ***Configuration→HEAT→HT.TY*** to a value of 2. The number of electric heat stages must be configured by setting ***Configuration→HEAT→N.HTR*** per the installed heater.

Fire Shutdown

If a Fire Shutdown or Smoke Detector accessory was field installed, the unit must be configured for it by setting ***Configuration→UNIT→FS.SW*** to normally open (1) or normally closed (2) when there is not a fire alarm. Normally open (1) is the preferred configuration.

NOTE: On standard units, the fire shutdown input is the terminals Fire Shutdown 1 and 2. On Humidi-MiZer™ units, the fire shutdown connections are at PL19.

Outdoor Enthalpy

If an Outdoor Enthalpy accessory was field installed, the unit must be configured for it by setting ***Configuration→ECON→EN.SW***, identifies the normally open or normally closed status of this input when the outdoor enthalpy is low.

IAQ Switch

If an IAQ Switch accessory was field installed, the unit must be configured for it by setting ***Configuration→AIR.Q→II.CF***, identifies the normally open or normally closed status of this input when the indoor air quality value is low (good) and also selects the unit response to this input.

NOTE: An IAQ switch cannot be used if an enthalpy switch is already on this input.

IAQ Sensor

If an CO_2 Sensor accessory was field installed, the unit must be configured for it by setting ***Configuration→AIR.Q→IA.CF*** selects the unit response to this input. Default conversion to 0 to 2000 ppm.

OAQ Sensor

If an Outdoor Air Quality Sensor accessory was field installed, the unit must be configured for it by setting ***Configuration→AIR.Q →OA.CF*** selects the unit response to this input. Default conversion to 0 to 2000 ppm.

Fan Status

If a Fan Status accessory was field installed, the unit must be configured for it by setting ***Configuration→UNIT→FN.SW*** to normally open (1) or normally closed (2). Normally open (1) is the preferred configuration.

NOTE: Fan Status input is not on the terminals marked Fan Status.

Filter Status

If a Filter Status accessory was field installed, the unit must be configured for it by setting ***Configuration→UNIT→FL.SW*** to normally open (1) or normally closed (2). Normally open (1) is the preferred configuration.

Programming Operating Schedules

The *Comfort*Link™ controls will accommodate up to eight different schedules (Periods 1 through 8), and each schedule is assigned to the desired days of the week. Each schedule includes an occupied on and off time. As an example, to set an occupied schedule for 8 AM to 5 PM for Monday through Friday, the user would set days Monday through Friday to ON for Period 1. Then the user would configure the Period 1 Occupied From point to 08:00 and the Period 1 Occupied To point to 17:00. To create a different weekend schedule, the user would use Period 2 and set days Saturday and Sunday to ON with the desired Occupied On and Off times.

NOTE: By default, the time schedule periods are programmed for 24 hours of occupied operation.

To create a schedule, perform the following procedure:

1. Scroll to the Configuration mode, and select CCN CONFIGURATION (CCN). Scroll down to the Schedule Number (***Configuration→CCN→SCH.O=SCH.N***). If password protection has been enabled, the user will be prompted to enter the password before any new data is accepted. ***SCH.N*** has a range of 0 to 99. The default value is 1. A value of 0 is always occupied, and the unit will control to its occupied set points. A value of 1 means the unit will follow a local schedule, and a value of 65 to 99 means it will follow a CCN schedule. Schedules 2−64 are not used as the control only supports one internal/local schedule. If one of the 2−64 schedules is configured, then the control will force the number back to 1. Make sure the value is set to 1 to use a local schedule.
2. Enter the Time Clock mode. Scroll down to the LOCAL TIME SCHEDULE (***SCH.L***) sub−mode, and press ENTER. Period 1 (***PER.1***) will be displayed.
3. Scroll down to the MON.1 point. This point indicates if schedule 1 applies to Monday. Use the ENTER command to go into Edit mode, and use the Up or Down key to change the display to YES or NO. Scroll down through the rest of the days and apply schedule 1 where desired. The schedule can also be applied to a holiday.
4. Configure the beginning of the occupied time period for Period 1 (OCC). Press ENTER to go into Edit mode, and the first two digits of the 00.00 will start flashing. Use the Up or Down key to display the correct value for hours, in 24−hour (military) time. Press ENTER and hour value is saved and the minutes digits will start flashing. Use the same procedure to display and save the desired minutes value.
5. Configure the unoccupied time for period 1 (***UNC***). Press ENTER to go into Edit mode, and the first two digits of the 00.00 will start flashing. Use the Up or Down key to display the correct value for hours, in 24−hour (military) time. Press ENTER and hour value is saved and the minutes digits will start flashing. Use the same procedure to display and save the desired minutes value.
6. The first schedule is now complete. If a second schedule is needed, such as for weekends or holidays, scroll down and repeat the entire procedure for period 2 (***PER.2***). If additional schedules are needed, repeat the process for as many as are needed. Eight schedules are provided. See Table 3 for an example of setting the schedule.

Table 3 – Setting an Occupied Time Schedule — Weekdays Only for 7:30 to 22:30

DISPLAY MENU	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TIMECLOCK SCH.L		ENTER			Local Occupancy Schedule	
	PER.1	ENTER	OCC.1		Period Occupied Time	
		ENTER		00.00		Scrolling stops
		ENTER		00.00		Hours Flash
		▲		07.00		Select 7
		ENTER		07.00		Change accepted, minutes flash
		▲		07.30		Select 30
		ENTER		07.30		Change accepted
		ESCAPE	OCC.1	07.30	Period Occupied Time	Item/Value/Units scrolls again
		▼	UNC.1	00.00	Period Unoccupied Time	
		ENTER		00.00		Scrolling stops
		ENTER		00.00		Hours Flash
		▲		22.00		Select 22
		ENTER		22.00		Change accepted, minutes flash
		▲		22.30		Select 30
		ENTER		22.30		Change accepted
		ESCAPE	UNC.1	22.30	Period Unoccupied Time	Item/Value/Units scrolls again
		▼	MON.1	NO	Monday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Change accepted
		ESCAPE	MON.1	YES	Monday In Period	Item/Value/Units scrolls again
		▼	TUE.1	NO	Tuesday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Change accepted
		ESCAPE	TUE.1	YES	Tuesday In Period	Item/Value/Units scrolls again
		▼	WED.1	NO	Wednesday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Change accepted
		ESCAPE	WED.1	YES	Wednesday In Period	Item/Value/Units scrolls again
		▼	THU.1	NO	Thursday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Change accepted
		ESCAPE	THU.1	YES	Thursday In Period	Item/Value/Units scrolls again
		▼	FRI.1	NO	Friday In Period	
		ENTER		NO		Scrolling stops
		▲		YES		Select YES
		ENTER		YES		Change accepted
		ESCAPE	FRI.1	YES	Friday In Period	Item/Value/Units scrolls again
		ESCAPE				
		ESCAPE				

SERVICE TEST

The Service Test function can be used to verify proper operation of compressors, heating stages, Humidi–MiZer™ System, indoor fan, outdoor fans, power exhaust fans, economizer, crankcase heaters, and the alarm relay. Use of Service Test is recommended at initial system start up and during troubleshooting (See Table 4 for point details).

Service Test mode has the following changes from normal operation:

- Outdoor air temperature limits for cooling circuits, economizer, and heating are ignored. Normal compressor time guards and other staging delays are reduced to 30 seconds or less.
- Circuit alerts are limited to 1 strike (versus 3) before changing to alarm shut down state.
- The status of ALM.N is ignored so all alerts and alarms are broadcast on CCN.
- The words "SERVICE TEST" are inserted into every alarm message.

Service test can only be turned ON/OFF at the unit display. Once turned ON, other entries may be made with the display or through CCN. To turn Service Test on, change the value of TEST to ON. To turn service test off, change the value of TEST to OFF.

NOTE: Service Test mode may be password protected. Refer to Basic Control Usage section for more information. Depending on the unit model, factory–installed options, and field–installed accessories, some of the Service Test functions may not apply.

Independent Outputs

The independent (INDP) submenu is used to change output status for the economizer, power exhaust stages, crankcase heaters, alarm relay, and outside air unit.. These independent outputs can operate simultaneously with other Service Test modes. All outputs return to normal operation when Service Test is turned off. When the economizer is using the factory default Digital Control Type (***Configuration→ECON→E.CTL*** is 1 or 2) then the Economizer Calibration feature may be used to automatically check and reset the economizer actuator range of motion. Refer to the economizer operation section of more details. On EnergyX equipped units, use the outside air unit (OAU) points to test the ERV components.

Fan Test

The fans (FANS) submenu is used to change output status for the indoor fan and outdoor fan stages. Indoor fan speed test (F.SPD) is only available for use when adaptive fan is configured (***Configuration→A.FAN→AF.EN***) for Yes. F.SPD runs the fan at the desired speed entered. Units with Humidi–MiZer systems have limited or no manual outdoor fan control from test mode.

Cooling Test

The cooling (COOL) submenu is used to change output status for the individual compressors. Compressor starts are staggered by 15 seconds. The fans (FANS) and heating (HEAT) service test outputs are reset to OFF for the cooling service test. Indoor fans and outdoor fans are controlled normally to maintain proper unit operation. If adaptive fan is configured, then the indoor fan speed will default to the Mech. Cooling Fan Speed configuration point (***Configuration→A.FAN→FS.CL***) when one compressor is turned on. The Reduced Cool Fan Speed (F.SPD) can only be changed while one stage is running. If more then one stage is on the actual fan speed will be 100%. F.SPD shows the reduced speed not actual speed. On single stage units, actual fan speed will be 100% when the compressor is on. All normal cooling alarms and alerts are functional.

When charging unit, all outdoor fans may be forced on in cooling service test modes by setting the Outdoor Fan Override (OF.OV) to on.

NOTE: Circuit A is always operated with Circuit B and/or C in Humidi-MiZer™ system equipped units.

Humidi–MiZer™ Test

For units with the factory Humidi-MiZer™ option, the Humidi-MiZer (HZMR) submenu is used to change the output status to operate the circuits in different Humidi–MiZer modes or to separately test the Humidi–MiZer valve operations. Refer to the Humidi-MiZer operation section for details on these modes and valves. The fans (FANS), cooling (COOL), and heating (HEAT) service test outputs are reset to OFF for the Humdi–MiZer service test. Indoor and outdoor fans are controlled normally to maintain proper unit operation. If adaptive fan is configured, then the indoor fan speed will default to the Reheat2 Fan Speed configuration point (***Configuration→A.FAN→FS.RH***) when Reheat2 test is turned on. The Reheat2 fan speed (F.SPD) only reflects the speed setting for testing Reheat2 circuits, and can only be changed when a circuit is in Reheat2. Actual speed may be different if Reheat 1 tests are being performed. All normal cooling alarms and alerts are functional. Refer to the Humidi–MiZer operating section for more information.

NOTE: Circuit A is always operated with Circuit B and/or C in Humidi-MiZer system equipped units.

Table 4 – Service Test Modes and Submodes Directory

DISPLAY MENU/ SUB–MENU/ NAME	EXPANDED NAME	VALUES
SERVICE TEST		
TEST	Field Service Test Mode	Off/On
INDP	Test Independent Outputs	
ECON	Economizer Position Test	0 to 100
E.CAL	Calibrate Economizer	Off/On
PE.1	Power Exhaust 1 Test	Off/On
PE.2	Power Exhaust 2 Test	Off/On
ALRM	Alarm Relay Test	Off/On
CCH	Crankcase Heat Test	Off/On
OA.DM	OAU 2-position Damper	Close/Open
WHL	OAU Wheel Test	0 to 100
OA.OF	OAU OA Fan Speed Test	0 to100
OA.XF	OAU PE Fan Speed Test	0 to100
OA.HT	OAU Tempring Heater Test	0 to 100
FANS	Test Fans	
IDF	Indoor Fan Power Test	Off/On
F.SPD	Indoor Fan Speed Test	0 to 100
OFC.1	Outdoor Fan 1 Test	Off/On
OFC.2	Outdoor Fan 2 Test	Off/On
OFC.3	Outdoor Fan 3 Test	Off/On
COOL	Test Cooling	
CMP.A	Cool A Test	Off/On
CMP.B	Cool B Test	Off/On
CMP.C	Cool C Test	Off/On
F.SPD	Reduced Cool Fan Speed	60 to 100
OF.OV	Outdoor Fan Override	Off/On
HMZR	Test Humidi–MiZer	
RH1.A	Reheat1 A Test	Off/On
RH1.B	Reheat1 B Test	Off/On
RH1.C	Reheat1 C Test	Off/On
RH2.A	Reheat2 A Test	Off/On
RH2.B	Reheat2 B Test	Off/On
RH2.C	Reheat2 C Test	Off/On
F.SPD	Reheat2 Fan Speed	65 to 100
CRC	Cool->Reheat1 Valve Test	Off/On
RHV.A	Reheat2 Valve A Test	Off/On
RHV.B	Reheat2 Valve B,C Test	Off/On
HEAT	Test Heating	
HT.1	Heat Stage 1 Test	Off/On
HT.2	Heat Stage 2 Test	Off/On
F.SPD	Reduced Heat Fan Speed	65 to 100

Heating Test

The heating (HEAT) submenu is used to change output status for the individual heat stages, gas or electric. The fans (FANS) and cooling (COOL) service test outputs are reset to OFF for the heating service test. Indoor and outdoor fans are controlled normally to maintain proper unit operation. If adaptive fan is configured, then the indoor fan speed will default to the heating configuration point (***Configuration→A.FAN→FS.HT***) when a stage of heat is turned on. The Reduced Heat Fan Speed (F.SPD) can only be changed while one stage is running. If more then one stage is on the actual fan speed will be 100%. F.SPD shows the reduced speed not actual speed. On single stage units actual fan speed will be 100% when that stage is turned on. All normal heating alarms and alerts are functional.

NOTE: Field terminal strip terminal R must be connected to W1 for the heat to operate in service test. Alert number T410 will occur as a reminder if not done. If the normal unit control mode is thermostat mode, then remove the R−W1 jumper after completing service test.

THIRD PARTY CONTROL

Third party controls may interface with the unit *Comfort*Link™ controls through the connections described below. See other sections of these instructions for more information on the related unit control and configurations.

Cooling/Heating Control

The thermostat inputs are provided on the field connection terminal board. The Unit Control Type configuration, ***Configuration→UNIT→U.CTL***, must be 2 to recognize the below inputs. Terminal R is the 24vac source for the following:

- Y1 = First stage cooling
- Y2 = Second stage cooling
- W1 = First stage heating
- W2 = Second stage heating
- G = Indoor fan

Dehumidification Control

On Humidi−MiZer™ units terminals Humidistat 1 and 2 are provided on the field connection terminal board. Humidity Switch configuration, ***Configuration→UNIT→RH.SW***, identifies the normally open or normally closed status of this input at LOW humidity. The Humidistat 1 terminal is the input signal and R can be used as the source.

NOTE: Dehumidification is considered a cooling function in the software and is only available on Humidi-MiZer equipped units.

Remote Occupancy

The remote occupancy input is provided on the field connection terminal board (TB1). The Remote Occupancy Switch configuration, ***Configuration→UNIT→RM.SW,*** identifies the normally open or normally closed status of this input when unoccupied.

- 5 = 24 VAC signal input
- 6 = 24 VAC source for dry contact

Fire Shutdown

The fire shutdown input is provided for unit shutdown in response to a fire alarm or smoke detector. The Fire Shutdown Switch configuration, ***Configuration→UNIT→FS.SW,*** identifies the normally open or normally closed status of this input when there is no fire alarm.

For 48/50 units without Humidi-MiZer system, input at field connection terminal board (TB1)

- Fire Shutdown 1 = 24 VAC source for dry contact
- Fire Shutdown 2 = 24 VAC signal input

For 50 series units with Humidi-MiZer system, input at wire harness plug 19 (PL 19). (See Fig. 7.)

- PL 19-3 = 24 VAC source for dry contact
- PL 19-5 = 24 VAC signal input

For 48 series units with Humidi-MiZer system, input at wire harness plug 19 (PL 19). (See Fig. 8.)

- PL 19-3 = 24 VAC source for dry contact
- PL 19-5 = 24 VAC signal for Fire Shutdown
- PL 19-4 = 24 VAC power for indoor fan contactor control circuit

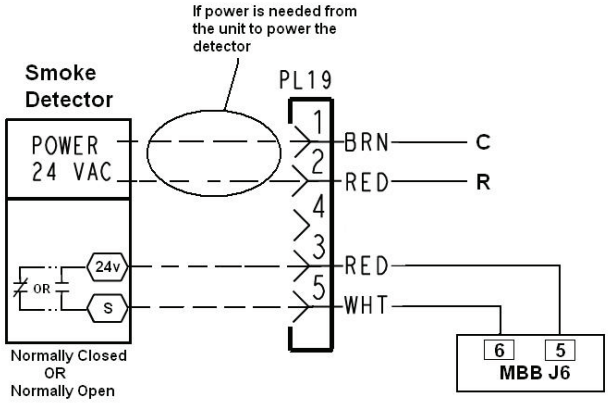
NOTE: If the indoor fan must be shut down without any delay upon Fire Shutdown input, then the factory jumper between PL19-3 and PL19-4 must be replaced with a normally closed contact when there is no alarm (open with alarm).

The plug PL19 is located in the return air section on 48/50PG03−14 size units and under the control box on and 48/50PM16−28 units.

Alarm Output

The alarm output is provided on the field connection terminal board (TB1) to indicate a current alarm status. The output will be 24VAC if a current alarm exists.

- C = 24 VAC common
- X = 24 VAC signal output



C08580

Fig. 7 − 50PG/PM Humidi−MiZer™ − Third Party Smoke Detector Wiring

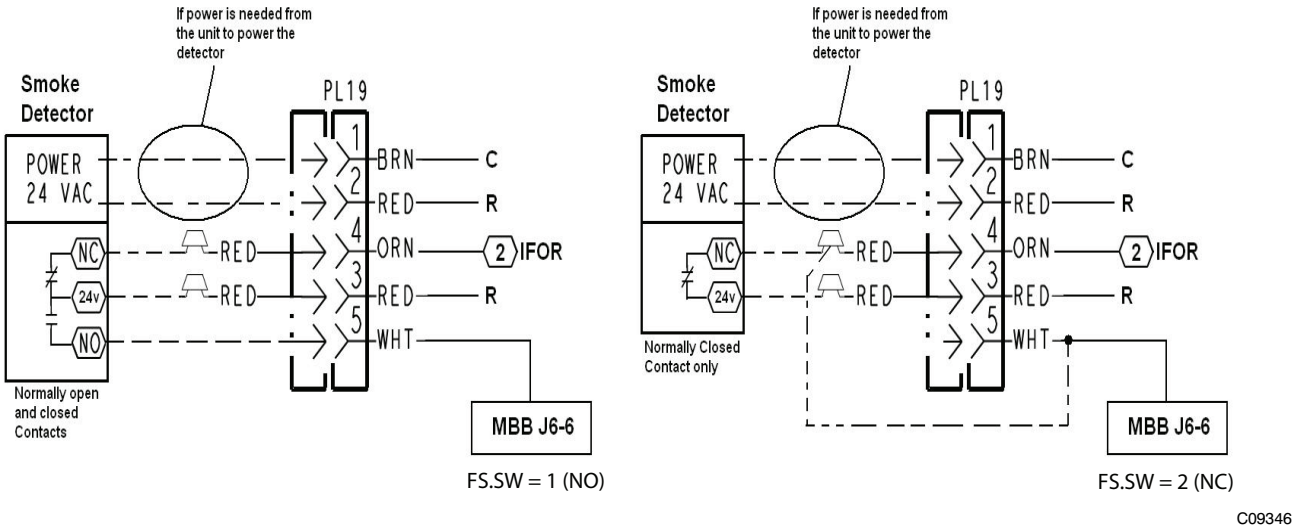


Fig. 8 – 48PG/PM Humidi–MiZer™ – Third Party Smoke Detector Wiring

Economizer Monitoring

On field terminal board (TB1), terminals 8, 9, and 10 can be used to monitor economizer position from a third party control system. See economizer operation section for additional information.

NOTE: Terminal 8 will not represent economizer position if the unit is equipped with Adaptive Fan.

In digital mode (E.CTL = 1 or 2), the economizer commanded position can be read as a 2–10v or 4–20mA signal. TB1–8 and TB1–9 are used as follows:

- To read a 2–10v signal, disconnect the violet wire on TB1–J10–8 and place volt meter device across TB1–8 and TB1–9.
- To read a 4–20mA signal, disconnect the violet wire on TB1–J10–8 and the 500Ω resister at TB1–J10–6. Place amp meter device between TB1–8 and TB1–9.

In analog mode (E.CTL = 3), the economizer position can be read as a 2–10v feedback signal across TB1–10 and TB1–9 at any time.

NOTE: The violet wire and 500Ω resister must be connected at the J10 connector as originally wired to operate the economizer in analog mode.

Economizer Damper Control

For units with the economizer option or accessory and the ECB control board, the damper position can be directly controlled through the IAQ sensor input provided on the field connection terminal board. The IAQ Analog Input configuration, ***Configuration→AIR.Q→IA.CF*** will have to set to 3 (Control Minimum Position). When IA.CF = 3, an external 4 to 20 mA source is used to move the damper 0% to 100% directly.

Terminal 2 = 4–20mA + signal
Terminal 3 = 4–20mA – common

NOTE: In this mode, preset minimum positions configurations are not valid, the damper position may exceed the input position to provide economizer cooling and CO_2 sensor input can not be used for DCV control. Refer to the Indoor Air Quality operation section for more information.

CONTROLS OPERATION

Display Configuration

The ***Configuration→DISP*** submenu is used to configure the local display settings.

Metric Display (METR)

This variable is used to change the display from English units to Metric units.

Language Selection (LANG)

This variable is used to change the language of the *Comfort*Link™ display. At this time, only English is available.

Password Enable (PROT)

This variable enables or disables the use of a password. The password is used to restrict use of the control to change configurations.

Service Password (PSWD)

This variable is the 4-digit numeric password that is required if enabled.

Test Display LEDs (TEST)

This is used to test the operation of the *Comfort*Link display.

Unit Configuration

Many configurations that indicate what factory options and/or field accessories are installed and other common operation variables are included in Unit Configuration (***Configuration→UNIT***). These configurations will be set in the factory for the factory–installed options (FIOPs). Field–installed accessories installed will require configuration changes. General unit and fan control configurations are also covered under this Unit Configuration menu.

Start–Up Delay (S.DLY)

This configuration sets the control start-up delay after the power is interrupted. This can be used to stagger the start-up of multiple units.

Unit Control Type (U.CTL)

This configuration defines if temperature control is based on thermostat inputs or space temperature sensor input.

- ***U.CTL = 2*** (Thermostat) – The unit determines cooling and heating demand by the state of G, Y1, Y2, W1, and W2 inputs from a space thermostat. This value is the factory default.
- ***U.CTL = 3*** (Space Sensor) – The unit determines cooling and heating demand based on the space temperature and the appropriate set point. Used also as Linkage configuration. The jumper wire in the installer's packet must be connected between R and W1 on the low voltage terminal board (TB) for heating mode to operate.

Thermostat Control Type (T.CTL)

This configuration applies only if Unit Control Type is Thermostat (***Configuration→Unit→U.CTL = 2***). The value determines alternative cooling and Humidi-MiZer™ circuit staging. See the Cooling and Humidi-MiZer sections for more information. The factory default value is ***T.CTL* = 0** (Adaptive).

Fan On When Occupied (OC.FN)

This configuration applies only if Unit Control Type is Space Sensor (***Configuration →Unit→U.CTL = 3***). A YES value will operate the indoor fan whenever the unit is in the Occupied mode. A NO value will operate the indoor fan only when heating or cooling is necessary. The factory default value is YES.

Shut Down on IDF Failure (IDF.F)

This configuration applies only if a fan switch is installed and configured. A YES value will enable diagnostic Alert T409 to shut down the unit when incorrect fan status is sensed. A NO value will still permit Alert T409 but will not cause unit shutdown. The factory default value is YES.

Fan Status Switch (FN.SW)

This configuration identifies if a fan status switch is installed, and what status (normally open, normally closed) the input is when the indoor fan is OFF.

Filter Status Switch (FL.SW)

This configuration identifies if a filter status switch is installed, and what status (normally open, normally closed) the input is when the filter is CLEAN.

Fire Shutdown Switch (FS.SW)

This configuration identifies if a fire shutdown switch is installed, and what status (normally open, normally closed) the input is when the fire or smoke alarm is OFF (no alarm).

Remote Occupancy Switch (RM.SW)

This configuration identifies if a remote occupancy switch is installed, and what status (normally open, normally closed) the input is when UNOCCUPIED.

SAT Settling Time (SAT.T)

This configuration sets the settling time of the supply air temperature (SAT). This tells the control how long to wait after a stage change before trusting the SAT reading. See Adaptive Thermostat Control (***U.CTL* = 2**, ***T.CTL* = 0**) and Space Sensor Control (***U.CTL* = 3**) within the Cooling operation section for more information. The factory default value is 240 seconds.

RAT Sensor On SPTO Input (RAT.S)

This configuration identifies if a return air temperature (RAT) sensor is installed on the space temperature offset (SPTO) input. A YES value enables RAT display. A NO value disables RAT display. Installing an RAT sensor will allow economizer differential dry bulb control. Refer to the economizer operation for more information.

RH Sensor On OAQ Input (RH.S)

This configuration identifies if a space relative humidity sensor is installed on the outdoor air quality (OAQ) input. A YES value enables ***SP.RH*** display. If a Humdi-MiZer unit, then the unit determines dehumidification demand based on this input and the appropriate set point. A NO value disables SP.RH display and use.

Space Humidity Switch (RH.SW)

This configuration identifies if a space relative humidity switch is installed on the ENTHALPY input, and what status (normally open, normally closed) the input is when the space humidity is LOW.

Temperature Compensated Start Cooling Factor (TCS.C)

This factor is used in the equation of the Temperature Compensated Start Time Bias for cooling. A setting of 0 minutes indicates Temperature Compensated Start in Cooling is not permitted.

Temperature Compensated Start Heating Factor (TCS.H)

This factor is used in the equation of the Temperature Compensated Start Time Bias for heating. A setting of 0 minutes indicates Temperature Compensated Start in Heating is not permitted.

Modes

The *Comfort*Link™ controls operate under a hierarchy of command structure as defined by four main elements: the System Mode, the HVAC Mode, the Occupied status, and the Unit Control Type.

The System Mode is the top level that defines three main states of the control system: Disabled, Enabled, or Test.

The HVAC Mode is the next level that defines four main states of functional operation: Disabled, Fan Only, Cool, and Heat.

The Occupied status affects set points for cooling and heating in Space Sensor control mode and operation of the economizer for indoor air quality ventilation and free cooling.

The Unit Control Type (***Configuration→UNIT→U.CTL***) defines if temperature control is based on thermostat inputs or space temperature sensor input.

The general operating mode of the control and the status of some related operation lockouts are located on the display at two locations: ***Run Status→ MODE*** and ***Operating Modes→ MODE***.

System Mode (SYS)

In Run Status and Operating Modes, the current system mode is displayed with expandable text. This is an overall state of the unit. Three states are: Unit Operation Disabled, Unit Operation Enabled, or Service Test Enabled.

HVAC Mode (HVAC)

In Run Status and Operating Modes, the current allowed HVAC mode is displayed with expandable text. This is the mode the unit decides to run in based on its inputs. There are four main HVAC modes; cooling has six different expanded texts. These modes are shown below.

HVAC Mode	Expanded Text	Brief Description
Disabled	HVAC Operation Disabled	Unit is in test mode or System mode is disabled
Fan Only	Ventilation (fan–only)	Fan may run for ventilation
Cooling	Cooling	Mechanical cooling
	Free Cooling	Only economizer used for cooling
	Unoccupied Free Cooling	Only economizer use for cooling (occupied cooling set point active)
	Reheat1	All running circuits in sub–cooling mode
	Reheat2	All running circuits in Hot Gas Reheat mode
	Reheat1/Reheat2	Sub–cooling and Hot Gas Reheat active
Heating	Heating	Heating mode

HVAC Operation Disabled (HV.DN)

Allow disabling of HVAC mode. This is only available on a network connection and shows if the unit has been forced into the disabled status.

Cool Setpoint In Effect (EFF.C)

This shows the actual setpoint that is being used for control during cooling mode. If a 0 is displayed, then space sensor control is not being used and the unit is being controlled by a thermostat.

Heat Setpoint In Effect (EFF.H)

This shows the actual setpoint that is being used for control during heating mode. If a 0 is displayed, then space sensor control is not being used and the unit is being controlled by a thermostat.

Currently Occupied (OCC)

Displays the current state of assumed space occupancy based on unit configuration and inputs.

Timed Override in Effect (T.OVR)

Displays if the state of occupancy is currently occupied due to an override.

Linkage Active (LINK)

Displays if a linkage communication "Linkage" is established between the unit and a linkage source.

Demand Limit in Effect (D.LMT)

Displays if a demand limit has been placed on the unit's capacity.

Compressor OAT Lockout (C.LOC)

Displays if operation of one or more compressors is prevented due to outdoor temperature limit lockout.

Heat OAT Lockout (H.LOC)

Displays if heating operation is prevented due to outdoor temperature limit lockout.

Econo Cool OAT Lockout (E.LOC)

Displays if economizer operation for cooling is prevented due to outdoor temperature limit lockout.

General Operation

48/50PG and 48/50PM units can provide cooling, dehumidification, heating, and ventilation operation. Each unit will operate under one of two basic types of control: thermostat or space temperature sensor. There are many inputs, configurations, safety factors, and conditions that ultimately control the unit. Refer to the specific operation sections for detail on a specific unit operation.

When thermostat control is enabled (***Configuration→UNIT →U.CTL = 1***), the unit will operate based on discrete input commands (G, Y1, Y2, W1, and W2) and there is a one minute time delay between modes and when re−entering a mode. The G command calls for ventilation, the Y1 and Y2 commands call for cooling, and the W1 and W2 commands call for heating. Thermostat Control Type (***Configuration→UNIT→T.CTL***) affects how cooling operates based on Y1 and Y2 commands and if cooling/heating stage time guards are applied.

When space temperature sensor control is enabled (***Configuration →UNIT→U.CTL = 2***), the unit will try to maintain the Space Temperature (***Temperatures→AIR.T→SPT***) between the effective cool and heat setpoints (***Run Status→MODE→EFF.C*** and ***EFF.H***). However, to minimize unnecessary cool to heat and heat to cool changes, there is a 10 minute delay after the last stage turns off before the control will switch modes and a 1 minute delay when re−entering the last mode. Linkage operation overrides the mode changeover delay to 15 seconds. The cooling and heating Mode Select Timeguard (***Operating Modes→COOL→MS.TG*** and ***Operating Modes→HEAT→MS.TG***) show the remaining time before allowing the respective mode to be entered.

Temperature Setpoint Determination

Setpoints are used to control the unit while under space temperature sensor control. The Cool Setpoint in Effect (EFF.C) and the Heat Setpoint in Effect (EFF.H) are the points in which the unit is controlling to at a specific time. These points are read only points and change according to occupancy, the offset slider status, and network writes (Linkage or LON).

If the building is in occupied mode, the Occupied Cool Setpoint (***Setpoints→OCSP***) and the Occupied Heat Setpoint (***Setpoints →OHSP***) are active. When the building is in unoccupied mode, the Unoccupied Cool Setpoint (***Setpoints→UCSP***) and the Unoccupied Heat Setpoint (***Setpoints→UHSP***) are active. The heating and cooling set points are also separated by a Heat−Cool Set Point Gap (***Setpoints→GAP***) that is user configurable from 2 to 10 degrees F. This parameter will not allow the setpoints to be set too close together, it will change the last setpoint adjusted if it is set within the GAP.

When the space sensor has a setpoint slider adjustment, the cool and heat setpoints (occupied) can be offset by sliding the bar from one side to the other. The SPT Offset Range (+/−) (***Setpoints →STO.R***) sets the total positive or negative degrees that can be added to the setpoints. With the slider in the middle, no offset is applied. Moving the slider to the "COOL" side will subtract from each setpoint, and sliding it to the "WARM" side will add to the setpoints. The slider offset being applied at any given time is displayed as Space Temperature Offset (***Temperatures→AIR.T →SPTO***).

Occupancy Determination

The building's occupancy is affected by a number of different factors. When the unit is operating with a space temperature sensor (T−55, T−56, T−58 or T−59), occupancy affects the unit set points and the operation of the economizer. If the unit is operating under thermostat control, occupancy only affects the operation of the economizer. If the unit's Humidi−MiZer™ is being controlled by a relative humidity sensor, then occupancy will affect the RH setpoints. The factors affecting occupancy are listed below from highest to lowest priority.

Level 1 Priority

Level 1 classification is a force/write to occupancy and can occur three ways. Listed in order of priority: force on OCCUPIED, a write to NVI_OCC, and a Linkage write. The CCN point OCCUPIED is forced via an external device such as a ComfortID™ controller or a service tool. When OCCUPIED is forced to YES, the unit is considered occupied, when OCCUPIED is forced to NO, the unit is considered unoccupied. If the 3rd party protocol LON is writing to NVI_OCC, the control maps it to OCCUPIED as an input. If the unit is being controlled by Linkage, the occupancy is communicated and mapped to OCCUPIED as an input. LON and Linkage do not force the point, only write to it, therefore a force applied to OCCUPIED will override them.

If OCCUPIED is not being forced or written to, proceed to the level 2 priority.

Level 2 Priority

Remote Occupancy Switch should be configured to either Normally Open or Normally Closed when the user would like to control the occupancy with an external switch. This switch is field−supplied (24v, single pole, single throw [SPST]). There are three possible configurations for the remote occupancy switch:

1. (***Configuration→UNIT→RM.SW = 0***) No Switch
2. (***Configuration→UNIT→RM.SW = 1***) Normally Open Switch
3. (***Configuration→UNIT→RM.SW = 2***) Normally Closed Switch

If the switch is configured to No Switch (0), the switch input value will be ignored and software will proceed to level 3 priority. For each type of switch, the appropriate configuration and states are listed in the table below. The Remote Occupancy Switch (***INPUTS→GEN.I→RM.OC***) point will show the status of the switch.

TYPE OF SWITCH	SWITCH CONFIGURATION	STATE OF SWITCH AND STATE OF OCCUPANCY
Occupied when Closed or Unoccupied when Open	Normal Open (1)	Open and Unoccupied
		Closed and Occupied
Occupied when Open or Unoccupied when Closed	Normal Closed (2)	Open and Occupied
		Closed and Unoccupied

NOTE: To perform remote occupancy, an Economizer Control Board must be installed in the unit.

Level 3 Priority

The following occupancy options are determined by the state of Occupancy Schedule Number (***Configuration→CCN→SCH.O →SCH.N***) and the Global Schedule Broadcast (***Configuration →CCN→ BROD→B.GS***).

1. (***Configuration→CCN→SCH.O→SCH.N = 0***)
   The unit is always considered occupied and the programmed schedule is ignored. This is the factory default.
2. (***Configuration→CCN→SCH.O→SCH.N = 1−64***)
   Follow the local programmed schedule. Schedules 1 to 64 are local within the controller. The unit can only store one local schedule and therefore changing this number only changes the title of the schedule table.
3. (***Configuration→CCN→SCH.O→SCH.N = 65−99***)
   Follow the global programmed schedule. If the unit is configured as a Global Schedule Broadcaster (***Configuration→CCN→BROD→B.GS = YES***), the unit will follow the unit's programmed schedule and broadcast the schedule so that other devices programmed to follow this schedule number can receive the schedule. If the unit is not programmed as a Global Schedule Broadcaster (***Configuration→CCN→BROD→B.GS = NO***), the unit will receive broadcasted schedules from a unit programmed to broadcast this schedule number. While using the programmed schedule, occupancy can be temporarily switched from unoccupied to occupied by pressing the override button for approximately 3 seconds on the T−55, T−56, T−58 or T−59 space temperature sensor. Override will only occur if SPT Override Enabled (***Configuration →CCN→SCH.O→OV.SP***) is set to YES. The length of the override period when pressing the override button is determined by the Override Time Limit (***Configuration →CCN→SCH.O→OV.TL***). The hours remaining in override is displayed as Timed Override Hours (***Configuration→CCN→SCH.O→OV.EX***). This point can also be changed from the local display or network to set or change the override period length.

Indoor Fan Operation

The indoor fan is controlled by the Indoor Fan Relay (***Outputs →FANS→IDF***) on the MBB (main base board) control, which then operates the indoor fan contactor (IFC). For gas heating units, the IGC control fan output is also monitored by the MBB control. This can result in additional modification of fan delays or other operation due to safety functions of the IGC control. The Humidi−MiZer™ gas heating units do not monitor the IGC fan output; instead an indoor fan on relay (IFOR) is used to allow the IGC to turn the fan on. If configured for IAQ fan operation, the fan may be turned on to satisfy air quality demands. See the Indoor Air Quality section if using IAQ (indoor air quality) accessory sensors. The fan can only be turned on under thermostat or space sensor control if the System Mode (SYS) status is enabled. The fan will remain on if compressors or heat relays are ever stuck on. If configured for fan status switch (FN.SW) and Shut Down on IDF Failure (***Configuration→UNIT→IDF.F = Yes***) is enabled, the fan and unit will be shutdown on alarm. See the Adaptive Fan section for information on its operation.

Thermostat Control

In thermostat mode, the IDF relay will be on in the following situations: fan request G in ON, cooling request Y1 or Y2 is ON, or heating request W1 or W2 is ON. If G is dropped or never on with an Y1, Y2, W1, or W2 call, the IDF relay will turn off after a configurable time delay with respect to the HVAC mode that is ending. The Fan−off Delay delays are as follows: Mech Cool (***Configuration→COOL→FOD.C***), Elect Heat (***Configuration →HEAT→FOD.E***), and Gas Heat (***Configuration→HEAT →FOD.G***).

Space Sensor Control

In Space Sensor mode, the IDF relay will be on if the unit is in Occupied mode and the indoor fan is configured to always run while occupied (***Configuration→UNIT→OC.FN = YES***). If the indoor fan is configured for intermittent fan (***Configuration →UNIT→OC.FN = No***), the fan will only be on when there are cooling, heating, or dehumidification stages running; or if there is an air quality demand. During the unoccupied period, the fan will operate intermittent. With intermittent fan, the IDF relay will turn off after a configurable time delay with respect to the HVAC mode that is ending. The Fan−off Delay delays are as follows: Mech Cool (***Configuration→COOL →FOD.C***), Elect Heat (***Configuration→HEAT→FOD.E***), and Gas Heat (***Configuration→HEAT→FOD.G***).

Cooling Operation

The 48/50PG and 48/50PM unit's cooling operation consists of: demand, mode determination, staging request to satisfy the demand, and handling a request with the unit's resources. These resources can include compressors, an economizer, and a reheat coil. This section covers mechanical cooling. For economizer and reheat cooling, refer to the Economizer and Humidi−mizer™ sections, respectively. The unit enters a cooling mode based on a demand, decides how to satisfy the demand, executes its plan, and then leaves the cooling mode.

Cooling Mode Control

The cooling HVAC mode (***Run Status→MODE→HVAC=3***) has six different expandable texts: Cooling, Free Cooling, Unoccupied Free Cooling, Reheat1, Reheat2, or Reheat1/Reheat2. These are all part of a general cooling mode and resemble the specific type of cooling that is being performed at any given time. All types of cooling are still performed under the general cooling function, and the expanded text is for user reference only. The control will display if it is ok to select the cooling mode (***Operating Modes →COOL→OK.CL= Yes***).

Thermostat Control

For the unit to enter cooling mode, three things must be true: the indoor fan must be ok to use, the mode changeover time guard must be expired, and there must be a cooling demand (Y1, Y2, or reheat demand). The unit will remain in cooling until the cooling demand is dropped or if any of the above conditions turn false. If only a reheat demand exists and a heat demand (W1, W2) occurs, the unit will end cooling. The cooling mode can not officially end until all compressors are off.

Space Sensor Control

For the unit to enter cooling mode, four things must be true: the indoor fan must be ok to use, the mode changeover time guard must be expired, the unit must have a valid space temperature, and there must be a cooling or reheat demand. The unit will remain in cooling for at least one minute and until the cooling demand drops below −0.5°F or if any of the above conditions turn false. If only a reheat demand exists and the heat demand becomes greater than the Reheat Heat Setpoint Deadband (***Setpoints→RH.HB***), the unit will end cooling. The cooling mode can not officially end until all compressors are off.

Staging Control

Once the unit is in a cooling mode, it must decide what the demand is and how to satisfy it. If an economizer is installed and can be used for cooling (***Operating Modes→COOL→OK.EC= Yes***), the unit will use it first (see economizer section for its operation). If the economizer can not be used or additional cooling is needed, a mechanical cooling check is performed. OK to use Compressors? (***Operating Modes→COOL→OK.MC***), will be set to yes when compressors are enabled and not locked out. Based on the unit control configuration, requested cooling stages (***Run Status →COOL→REQ.C***) will be determined then passed to compressor control to actually add the cooling stages.

Thermostat Control

There are two ways of requesting stages when thermostat control is enabled, Traditional Thermostat control or Adaptive control. Traditional Thermostat control is used if the Thermostat Control Type (T.CTL) is set to 1, 2, or 3 and the economizer is not available for free cooling. If Thermostat Control (T.CTL) is set to 0 or any time the economizer is available for free cooling, the unit will use Adaptive control for staging.

T.CTL = 0 (Adaptive Control)

Stage timers, Supply air trend, and supply air temperature limits apply when determining the request for stages. The first request (REQ.C=1) comes immediately when the Y1 input is active. The Cool Stage Increase Time (***Configuration→COOL→C.INC***) or the Cool Stage Decrease Time (***Configuration→COOL→C.DEC***) has to expire before another stage can be added or a stage can be subtracted. The Supply−Air Trend (***Operating Modes→COOL→SA.TR***) decides if the next stage can be requested or should be subtracted based on the Y2 input status. For 48/50PG16 units, the supply air trend will allow up to 2 requested stages for just the Y1 input and allow up to 3 requested stages for an Y1 and Y2 input. If the Y1 and Y2 inputs are dropped, the supply air trend is not considered because cooling is no longer needed. If at any time the Supply−Air Temperature (SAT) falls below the Minimum Supply Air Temperature Upper Level (***Configuration→COOL→SAT→SAT.U***), the requested stages will not be allowed to increase. If at any time the SAT falls below the Minimum Supply Air Temperature Lower Level (***Configuration→COOL→SAT→SAT.L***), the requested stages will be reduced by one without honoring C.DEC. If SAT.L and SAT.U are configured so that they are close together, the last stage of compressor might cycle rapidly, slowed only by its minimum on and off−time requirements.

T.CTL = 1 (1 Stage Y1)

Stage timers, Supply air trend, and supply air temperature limits do not apply when determining the request for stages. Request staging will follow the thermostat inputs directly. Y1 will request one stage. Y2 will request all stages.

T.CTL = 2 (2 Stage Y1)

Stage timers, Supply air trend, and supply air temperature limits do not apply when determining the request for stages. Request staging will follow the thermostat inputs directly. Y1 will request two stages on 48/50PG16 units and one stage for all other units. Y2 will request all stages.

T.CTL = 3 (Digital)

Stage timers, Supply air trend, and supply air temperature limits do not apply when determining the request for stages. Request staging will follow the thermostat inputs directly. Y1 will request one stage. Y2 will request two stages. Y1 and Y2 will request three stages on 48/50PG16 units and two stages for all other nits.

Space Sensor Control

Space sensor staging control is an adaptive anticipation control that weighs the actual space demand against the trend of that demand and the trend of the supply air. It also honors stage time guards and supply air limits. The demand for cooling in the space is displayed as the Cooling Demand (***Run Status→COOL →DMD.C***). The control tries to anticipate the change in the space because of its current stage status. This anticipation is based on the Supply−Air Trend (***Operating Modes→COOL→SA.TR***) and the Cool Demand Trend (***Operating Modes→COOL→TRD.C***). These trends will show the control how the space is reacting to the current running conditions and help it decide when to add or remove one stage from the requested stages. The Cool Stage Increase Time (***Configuration→COOL→C.INC***) or the Cool Stage Decrease Time (***Configuration→COOL→C.DEC***) has to expire before another stage can be added or a stage can be subtracted. If at any time the Supply−Air Temperature (SAT) falls below the Minimum Supply Air Temperature Upper Level (***Configuration→COOL→SAT→SAT.U***), the requested stages will not be allowed to increase. If at any time the SAT falls below the Minimum Supply Air Temperature Lower Level (***Configuration→COOL→SAT→SAT.L***), the requested stages will be reduced by one without honoring C.DEC. If SAT.L and SAT.U are configured so that they are close together, the last stage of compressor might cycle rapidly, slowed only by its minimum on and off−time requirements.

Compressor Control

The compressor control works hand and hand with the staging control. As the staging control requests stages, the compressor control determines what actual compressors are available or running and tries to provide stages for what is requested. The availability of a compressor depends on time guards, circuit diagnostics, outdoor temperature, and the unit size.

The Number of Circuits (***Configuration→COOL→N.CIR***) configuration tells the control how many compressors are installed on the unit. The Circuit A Lockout Temp (***Configuration→COOL→CIR.A →CA.LO***), Circuit B Lockout Temp (***Configuration→COOL →CIR.B→CB.LO***), and Circuit C Lockout Temp (***Configuration →COOL→CIR.C→CC.LO***) configurations set the outdoor temperature in which the respective compressor is allowed to run down to. Timeguard A (***Run Status→COOL→CIR.A→TG.A***), Timeguard B (***Run Status→COOL→CIR.B→TG.B***), and Timeguard C (***Run Status→COOL→CIR.C→TG.C***) display the time a respective compressor has before it is available for use. Individual circuit diagnostic tests are performed during operation which may or may not allow a compressor to be used. The configuration point Compressors On Circuit A (***Configuration →COOL→N.A***) informs the control to run diagnostics on one or two compressors for circuit A. The available stages at any given time are displayed as Available Compressors (***Run Status→COOL →AVL.C***). The actual compressors running at any given time are displayed as Actual Cooling Stages (***Operating Modes→COOL →ACT.C***). Compressor A (***Run Status→COOL→CIR.A →CMP.A***), Compressor B (***Run Status→COOL→CIR.B →CMP.B***), and Compressor C (***Run Status→COOL→CIR.C →CMP.C***) are displayed on when the respective compressor is running.

There are time guards to protect the compressors. Compressor Min On Time (***Configuration→COOL→MRT.C***) and Compressor Min Off Time (***Configuration→COOL→MOT.C***) apply before a compressor can be turned back on or turned off.

Outdoor Fan Control

Each unit has a means for variable outdoor airflow to control condenser pressure control within an acceptable range by responding to varied operating modes and ambient temperatures. This is implemented differently on different units using multi−speed motors, multiple outdoor fans, or variable−speed motor controllers.

NOTE: Factory default configurations account for these model differences and should not be changed. The default configurations have been qualified over a large range of conditions and are provided in case a field replacement of a control board occurs and the settings need to be checked or manually configured. Outdoor fan operation is further described below to assist in troubleshooting.

The outdoor fans are controlled by levels. There are 4 levels of operation (0−3) and the current operating level is shown as Outdoor Fan Level (***Operating Modes→COOL→F.LEV***). The fan level selected during operation is based on factory configurations of outdoor temperature limits and condenser pressure limits. These are in the Outdoor Fan Control submenu (***Configuration→COOL→OFC***) and shown in Table 5. The starting level is picked after a compressor is turned on and is based on the Outdoor Air Temperature (***Temperatures→AIR.T→OAT***). A circuit's Saturated Condensing Temperature (***Temperatures →REF.T→SCT.x***) can override the fan level at any time if the specific Fan Level Max Pressure (***Configuration→COOL→OFC →x.MXP***) is exceeded. This override will end if the circuit's saturated condensing temperature (SCT) drops below the specific Fan Level Min Pressure (***Configuration→COOL→OFC →x.MNP***). The number of fans and contactors on at a given fan level depends on the specific unit options and size. See Tables 6 and 7 and below text for specific fan and contactor status at any given fan level.

Units Without Humidi−MiZer™ System

Outdoor Fan Motors (OFM) are controlled by Outdoor Fan Contactors (OFC) which are controlled by the main base board (MBB).

For 48/50PG03−07 units, a duel speed motor is used. The Compressor Contactor (C.A1) turns the OFM on in high speed and the OFC1 is used to change to low speed.

For 48/50PG08−14 units, OFM1 is controlled by OFC1 and OFM2 is controlled by OFC2.

For 48/50PG16 units, OFM1 is controlled by OFC1 and OFM1 and 2 are controlled by OFC2.

For 48/50PG20−28 and 48/50PM16−28 units, OFM1 is controlled by OFC1, OFM4 is controlled by OFC3, and OFC2 controls the remaining two fans (16 and 20 size) or remaining 4 fans (24 and 28 sizes).

Units With Humidi−MiZer System

Outdoor fan control for Humidi−MiZer units includes a Motormaster® variable−speed control of some or all outdoor fans, depending on unit size. The Motormaster control automatically adjusts the outdoor fan speed to maintain approximately 80° to 100°F condenser temperature for circuit A at all outdoor ambient temperatures. Some unit sizes have additional on/off staging of some outdoor fans. The fan level operation is determined by some or all Outdoor Fan Control configurations described above, plus additional Humidi−MiZer Configuration (***Configuration →HZMR***). Refer to the Humidi−MiZer operation section for details on the Reheat function fan control.

For 48/50PG03−07 units, one outdoor fan is controlled in all modes by the Motormaster® sensing on circuit A.

For 48/50PG08−14 units, 2 outdoor fans are controlled in all modes by the Motormaster sensing on circuit A.

For 48/50PG16 units, 3 outdoor fans are controlled in normal cooling and sub−cooling Reheat1 modes by the Motormaster sensing circuit A. Two of the fans are additionally controlled with OFC.1 output, based on outdoor temperature, during the hot−gas Reheat2 mode (level 1 = 1 fan, level 2 = 3 fans).

For 48/50PG20−28 and 48/50PM16−28 units, contactor OFC1 controls power to the Motormaster which controls OFM1 and OFM4. Contactor OFC2 controls the remaining two fans (16 and 20 size) or remaining 4 fans (24 and 28 sizes).

Table 5 – Outdoor Fan Level Transitions

FAN LEVEL	OUTDOOR TEMPERATURE (F)	
	Without Humidi−MiZer™ System	With Humidi−MiZer System
Level 2 On	55 (sizes 03−20), 45 (sizes 24−28)	61 (PG03−16, sizes 24−28), 68 (size 20, PM16)
Level 2 Off	45 (PG03−16), 50 (size 20, PM16), 40 (sizes 24−28)	57
Level 3 On	65	68 (PG03−16, size 24−28), 88 (size 20, PM16)
Level 3 Off	55	62 (PG03−16, size 24−28), 78 (size 20, PM16)

NOTE: Where not specified, the models are both PG and PM. Levels 0 and 1 are only in play if the OAT is lower than the Level 2 On temperature and the pressure is not above its respected max.

Table 6 – 48/50PG03−16 Fan Level Control of Fans and Contactors

FAN LEVEL	48/50PG03−07		48/50PG08−14		48/50PG16	
	Standard Unit	Humidi−MiZer Unit	Standard Unit	Humidi−MiZer Unit	Standard Unit	Humidi−Mizer Unit
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFC1 On Low Speed	Motormaster Fan 1	OFC1 On, OFC2 Off Fan 1 On	Motormaster Fan 1 and Fan 2	OFC1 On, OFC2 Off Fan 1 On	Motormaster, OFC1 Off Fan 2
2	OFC1 Off High Speed	N/A	OFC1 On, OFC2 On Fan 1 and 2 On	N/A	OFC1 On, OFC2 On Fan 1, 2, 3 On	Motormaster, OFC1 On Fan 1, 2, 3
3	N/A	N/A	N/A	N/A	N/A	N/A

Table 7 – 48/50PG20−28 and PM16−28 Fan Level Control of Outdoor Fan contactors (OFC(X))

FAN LEVEL	With Humidi−MiZer System		With Humidi−MiZer System
	Circuit A	Circuit B	Circuit A and B
0	−	−	−
1	1 1, 3 (PG28)	3	1
2	1,2 (20, PM16) 2 (24−28)	2, 3 (20, PM16) 2 (24−28)	1, 2 (20, PM16) 2 (24−28)
3	1,2 1, 2, 3 (PG28)	2, 3	1, 2

Heating Operation

The 48/50PG and 48/50PM unit's heating operation consists of: demand, mode determination, staging request to satisfy the demand, and handling a request with the unit's resources. These resources can be gas heat or electric heat. This section covers both gas heat units and electric heat units. The Type of Heat Installed (***Configuration→HEAT→HT.TY***) configuration will be factory set to 1 for gas units, 2 for electric heat units with heaters installed, and 0 for electric heat units without heat installed. The unit enters a heating mode based on a demand, decides how to satisfy the demand, executes its plan, and then leaves the heating mode.

Heating Mode Control

The heating HVAC mode (***Run Status→MODE→HVAC=4***), represents both types of heating (gas or electric) under all types of control. For the unit to be allowed to enter the heat mode, heat must be enabled (***HT.TY = 1 or 2***), and the Outdoor Air Temperature (***Temperatures→AIR.T→OA***T) must be less than the Heating Lockout Temp (***Configuration→HEAT→HT.LO***). Heat OAT Lockout (***Run Status→MODE→H.LOC***) displays when heat is locked out on outdoor temperature and therefore can not allow heat mode. The control will display if it is ok to select the heating mode (***Operating Modes→HEAT →OK.HT= Yes***).

Thermostat Control

For the unit to enter heating mode, three additional things must be true: the indoor fan must be ok to use, the mode changeover time guard must be expired, and there must be a heating demand (W1, W2). The unit will remain in heating until the heating demand is dropped or if any of the above conditions turn false. The heating mode can not officially end until all heat stages are off and the IGC fan request is dropped (on gas units without Humidi−MiZer™).

Space Sensor Control

For the unit to enter heating mode, five additional things must be true: the indoor fan must be ok to use, the mode changeover time guard must be expired, the unit must have a valid space temperature, the W1 jumper must be installed, and there must be a heating demand. The unit will remain in heating for at least one minute and until the heat demand drops below −0.5°F or if any of the above conditions turn false. The heating mode can not officially end until all heat stages are off and the IGC fan request is dropped (on gas units without Humidi−MiZer).

Supply−Air Temperature Sensor (SAT)

The SAT Heat Mode Sensing (***Configuration →HEAT→SAT→SAT.H***) informs the unit if the supply air sensor has been relocated downstream of the heat section. This configuration affects the Supply Air Temperature (***Temperatures →AIR.T→SAT***) value displayed as listed below.

When SAT.H = DSBL, the Supply Air Temperature (***Temperatures →AIR.T→SAT***) value on the Scrolling Marquee and the CCN tables will be forced to zero when heat outputs turn ON or OFF and for 5 minutes after. The default Supply Air Temperature location is at the fan inlet, upstream of the heat section.

When SAT.H = ENBL, the Supply Air Temperature (***Temperatures →AIR.T→SAT***) sensor reading is displayed at the Scrolling Marquee and the CCN tables during heating mode. This setting should only be used if the original SAT sensor wires are removed from the Main Base Board (MBB) and replaced by an accessory SAT sensor located in the supply duct downstream of the heat section.

There are two supply air temperature limits that affect heating operation, the Maximum SAT Lower Level (***Configuration →HEAT→SAT→SAM.L***) the Maximum SAT Upper Level (***Configuration→HEAT→SAT→SAM.U***). Any time the supply air temperature rises above SAM.L the heat staging will be limited to what is currently on and no additional stages can be added until the supply air temperature falls back below SAM.L. If the supply air temperature rises above SAM.U, then heating will be reduced by removing a heat stage. That stage can not be added again until the Supply Air Temperature falls below SAM.L. If the supply air temperature stays above SAM.U, then another stage will be removed after the Heat Stage Decrease Time (***Configuration →HEAT→H.DEC***). If SAM.L and SAM.U are configured so that they are close together, the last stage of heat might cycle rapidly, slowed only by its minimum on and off−time requirements.

Staging Control

Once the unit is in a heating mode, it must decide what the demand is and how to satisfy. Based on the unit control configuration, requested heating stages (***Run Status→HEAT→REQ.H***) will be determined then passed to heat control to actually add the heating stages.

Thermostat Control

There are two ways of requesting stages when thermostat control is enabled: Traditional Thermostat control or Adaptive control. Traditional Thermostat control is used if the Thermostat Control Type (T.CTL) is set to 1, 2, or 3. Adaptive control is used if Thermostat Control (T.CTL) is set for 0.

T.CTL = 0 (Adaptive Control)

Stage timers and supply air temperature limits apply when determining the request for stages. The first request (REQ.C=1) comes immediately when the W1 input is active. The Heat Stage Increase Time (***Configuration→HEAT→H.INC***) or the Heat Stage Decrease Time (***Configuration→HEAT→H.DEC***) has to expire before another stage can be added or a stage can be subtracted. If at any time the Supply−Air Temperature (SAT) rises above the Maximum Supply Air Temperature Lower Level (***Configuration→HEAT→SAT→SAM.L***), the requested stages will not be allowed to increase. If at any time the SAT rises above the Maximum Supply Air Temperature Upper Level (***Configuration→HEAT→SAT→SAM.U***), the requested stages will be reduced by one without honoring H.DEC.

T.CTL = 1, 2 or 3 (Traditional thermostat control)

Stage timers and supply air temperature limits do not apply when determining the request for stages. Request staging will follow the thermostat inputs directly. W1 will request one stage. W2 will request all stages.

Space Sensor Control

Space sensor staging control is an adaptive anticipation control that weighs the actual space demand against the trend of that demand. It also honors stage time guards and supply air limits. The demand for heating in the space is displayed as the Heating Demand (***Run Status→HEAT→DMD.H***). The control tries to anticipate the change in the space because of its current stage status. This anticipation is based on the Heat Demand Trend (***Operating Modes →HEAT→TRD.H***). This trend will show the control how the space is reacting to the current running conditions and help it decide when to add or remove one stage from the requested stages. The Heat Stage Increase Time (***Configuration→HEAT→H.INC***) or the Heat Stage Decrease Time (***Configuration→HEAT →H.DEC***) has to expire before another stage can be added or a stage can be subtracted. If at any time the Supply−Air Temperature (SAT) rises above the Maximum Supply Air Temperature Lower Level (***Configuration→HEAT→SAT→SAM.L***), the requested stages will not be allowed to increase. If at any time the SAT rises above the Maximum Supply Air Temperature Upper Level (***Configuration→HEAT→SAT→SAM.U***), the requested stages will be reduced by one without honoring H.DEC.

Heat Relay Control

The heat relay control is responsible for energizing or de−energizing the MBB's heat stage relays and works hand in hand with the staging control. As the staging control requests stages, the heat relay control determines what actual heat relays are available or energized and tries to provide stages for what is requested. The availability of a heat relays depends on heat being installed, how many stages, and time guards. The type of Heat Installed (***Configuration→HEAT→HT.TY***) must be set for gas or electric for any stages to be available. The Number of Heat Stages (***Configuration→HEAT→N.HTR***) configuration tells the control how many heat relays can be used. Heat Stage 1Timeguard (***Run Status→HEAT→TG.H1***) and Heat Stage 2 Timeguard (***Run Status→HEAT→TG.H2***) display the time a respective heat relay has before it is available for use. The available stages at any given time are displayed as Available Heating Stages (***Run Status →HEAT→AVL.H***). The actual heat relays on at any given time are displayed as Actual Heating Stages (***Operating Modes→HEAT →ACT.H***). Heat Stage 1 Relay (***Run Status→HEAT→HT.1***) and Heat Stage 2 Relay (***Run Status→HEAT→HT.2***) are displayed on when the respective relay is energized. There are time guards to protect from short cycling, Heat Minimum On Time (***Configuration→HEAT→MRT.H***) and Heat Minimum Off Time (***Configuration→HEAT→MOT.H***) apply before a heat relay can be turned back on or turned off.

Integrated Gas Controller (IGC)

The heat staging is determined as described above and the Integrated Gas Controller (IGC) initiates the gas heat module start−up. The Integrated Gas Controller (IGC) minimum on−time of 1 minute will be followed even if Heat Minimum On Time (***Configuration→HEAT→MRT.H***) is lower and during Service Test. If the IGC temperature limit switch opens within 10 minutes of the end of the gas heat cycle, the next fan off delay will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified by the IGC, the fan off delay will not change back to the configured Fan−off Delay, Gas Heat (***Configuration→HEAT →FOD.G***) unless power is reset to the control. A light emitting diode (LED) is provided on the IGC to indicate status. During normal operation the LED is continuously on. See the Troubleshooting section if the LED is off or flashing. The IGC is located behind the gas section access panel door.

When the control energizes Heat Stage 1 Relay (***Run Status →HEAT→HT.1***), power is sent to the W terminal on the IGC board. A check is made to ensure that the rollout switch and limit switch are closed. The induced−draft motor is then energized, and when speed is proven with the Hall Effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds. If the burners do not light, there is a 22−second delay before another 5−second attempt. If the burners still do not light, this sequence is repeated for 15 minutes. After the 15 minutes have elapsed, if the burners still have not lit, heating is locked out. The control will reset when the request for heat is temporarily removed. When ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, limit switches, the Hall Effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat or space sensor set for fan auto, 45 seconds after ignition occurs the indoor−fan motor will be energized (and the outdoor−air dampers will open to their minimum position). If for some reason the over temperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45−second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control. When the control energizes Heat Stage 2 Relay (***Run Status→HEAT→HT.2***), power is supplied to the second stage of the main gas valve. If both stage 1 and stage 2 of the gas valve close, gas will be turned off to the main burners.

Economizer

If an economizer is installed, then Economizer Installed configuration (***Configuration→UNIT→EC.EN***) should be set to YES. The economizer is controlled by the economizer output signal (***Outputs→ECON→EC.CP***) on the ECB control. If the indoor fan is off or the building is unoccupied, the economizer position is zero. If in Occupied mode and the unit is heating or cooling and the economizer cannot provide free cooling, the economizer position is the configured economizer minimum position (***Configuration→ECON→EC.MN***) or the position specified by the IAQ algorithm. If in Unoccupied mode, the position is 0% open.

The economizer will be allowed to help with cooling if the outdoor-air temperature (***Temperature→AIR.T→OAT***) is less than the configured economizer high temperature lockout (***Setpoints→EH.LO***) and greater than the configured economizer low temperature lockout (***Setpoints→EL.LO***). If an enthalpy sensor is installed, the outdoor temperature must be below the economizer high temperature lockout and the enthalpy (***Inputs→GEN.I→ENTH***) must be LOW. If a return air temperature (RAT) sensor is installed and Diff Dry Bulb Control (***Configurations→ ECON → DF.DB = Enable***) is enabled, the outdoor air temperature must be lower than the return air temperature in addition to the the lockouts and enthaply. For cooling, the economizer position can vary between the configured economizer minimum position (***Configuration→ECON→EC.MN***) and the economizer maximum cooling position (***Configuration→ECON→EC.MX***).

Thermostat Control

If the unit is in cooling, operating under thermostat control, Y1 = ON, and the economizer is available for cooling, the economizer will control the supply-air temperature to the low cool set point (***Setpoints→LCSP***). When Y2 = ON, the economizer will control the supply-air temperature to high cool set point (***Setpoints→HCSP***).

Space Sensor Control

If the unit is in cooling, operating under space temperature control, the economizer is available for cooling, and no compressors are operating, the economizer will control the SAT to either ***Setpoints→LCSP*** or ***Setpoints→HCSP*** (See Table 8.) If a compressor is ON, the economizer will try to position itself at the economizer maximum cooling position (***Configuration→ECON→EC.MX***).

If the control senses low suction pressure for any active refrigerant circuit when the economizer is also providing cooling, the maximum allowable economizer position will be reduced. Factory default configurations have been qualified over a large range of conditions and should only be changed with care. For unit troubleshooting, factory default maximum economizer limits for this condition are provided in Table 9.

Table 8 – LCSP and HCSP Transitions for Space Temperature Mode

CURRENT SAT SET POINT	COOL DEMAND (ΔF)	NEXT SAT SET POINT
LCSP	>0.5	HCSP
HCSP	<0	LCSP
LCSP	<–0.5	Exit Cooling

LEGEND
HCSP – High Cool Set Point
LCSP – Low Cool Set Point
SAT – Supply–Air Temperature

Table 9 – Maximum Economizer Limits During Low Suction Pressure

COOLING STAGE	SIZES 03-07	SIZES 08-14	SIZE 16	SIZES 20–28
Bottom	50	50	50	50
Middle	—	—	35	50
Top	—	25	25	0

Economizer Actuator Communications

The actuator used with 48/50PG and PM units is a Multi–Function Technology (MFT) actuator. This allows the *Comfort*Link™ system to communicate with the actuator through a feedback signal. The configuration Economizer Control Type determines the communication method, either digital or analog, used to communicate between the ECB and the economizer actuator. Economizer Control Type is accessible via the Scrolling Marquee at ***Configurations→ECON→E.CTL***. **The power to the unit must be cycled after E.CTL is changed**.

NOTE: If unit is equipped with Adaptive Fan, the control automatically defaults the economizer control type to 1 (E.CTL = 1) and controls the actuator digitally. This is because the analog signal from the ECB is used to drive the VFD's speed and therefore can not be used to control the actuator. The field connection terminal block TB–8 no longer represents the commanded or actual position of the actuator.

E.CTL = 1 or 2 (Digital/Position or Digital/Command)

When E.CTL is set to 1, the ECB will communicate with the economizer actuator using the digital protocol, from ECB J7–1 to actuator pin 5. The commanded position and the actuators actual position are communicated back and forth between actuator and ECB. When the ECB and actuator first initiate communication, a control angle (***Operating Modes→ECON→C.ANG***) is provided to the ECB and represents the actuator's range of motion. This control angle must be greater then the minimum angle (***Configurations→ECON→M.ANG***).

During this digital control, the ECB's analog 4 to 20mA output will represent the actuator's actual position when E.CTL = 1 or commanded position when E.CTL = 2. Because the wiring has a built–in 500–ohm resistor, the 4 to 20mA signal is converted to a 2 to 10–v signal that is accessible via field connection terminal board TB–8 and TB–9. However, before this signal can be read remotely, the violet wire that connects the actuator to field connection terminal board TB–J10–8 must be removed or cut.

E.CTL = 3 (Analog Control)

When E.CTL is set to 3, the ECB will NOT communicate with the economizer actuator using the digital MFT. It will instead control the actuator directly with the 4 to 20 mA analog signal wired to TB–8 and TB–9 along with the 500–ohm resistor producing a 2 to 10–v signal for the actuator. While in this mode, the actuator's built–in 2 to 10–v feedback signal is accessible via TB–9 and TB–10 any time because it is not used by the ECB.

Unoccupied Free Cooling

The unoccupied free cooling algorithm attempts to maintain the building space temperature half way between the occupied cool and occupied heat setpoints using only the economizer when the conditions in the building and the outdoors are suitable. Three different configurations define this algorithm: Unoccupied Free Cooling ***(Configuration→ECON→UEFC)***, Free Cooling Preoccupancy Time ***(Configuration→ECON→FC.TM)*** and Free Cool Low Temp Limit ***(Configuration→ECON→FC.LO)***.

UEFC = 0 (Disabled)

When UEFC = 0, unoccupied free cooling is disabled. Cooling will only occur if the space exceeds the unoccupied setpoints.

UEFC = 1 (Unoccupied)

When UEFC is set to 1, unoccupied free cooling can occur throughout the entire unoccupied period. The space temperature must be higher then the mid–point between the occupied cooling and heating setpoints.

UEFC = 2 (Preoccupancy)

When UEFC is set to 2, unoccupied free cooling can only occur when the time until the next occupied period is less than the Free Cool PreOcc Time (FC.TM) in minutes.

Free Cool PreOcc Time (FC.TM)

FC.TM is the configuration that determines how many minutes before occupancy that free cooling can occur when set for Preoccupancy (UEFC = 2).

Free Cool Low Temp Limit (FC.LO)

Unoccupied free cooling cannot occur if the Outdoor Air Temperature ***(Temperature→ AIR.T→ OAT)*** is less than FC.LO.

Power Exhaust

To enable power exhaust, ***Configuration→ECON→PE.EN*** must be set to ***ENBL***. If power exhaust is enabled, Power Exhaust 1 will turn on when the economizer position is greater than the value of ***Configuration→ECON→PE.1***. If power exhaust is enabled, Power Exhaust 2 will turn on when the economizer position is greater than the value of ***Configuration→ECON→PE.2***. There are small time delays to ensure that rapid cycling does not occur.

Optional Humidi−MiZer™ Dehumidification System

Units with the factory−equipped Humidi−MiZer option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle. The Humidi−MiZer option includes additional valves in the liquid line and discharge line of each refrigerant circuit, a small reheat condenser coil downstream of the evaporator, and Motormaster® variable−speed control of some or all outdoor fans. The Humidi−MiZer Equipped (***Configuration→HMZR→REHT***) configuration is factory set to Yes for Humidi−MiZer equipped units. This enables Humidi−MiZer operating modes and service test.

NOTE: If the unit is a Humidi−MiZer unit, this configuration must always be set to yes. The Humidi−MiZer option does affect the base unit wiring.

Humidi−MiZer operation requires installation and configuration of either a space relative humidity sensor or a relative humidity switch input. Space Humidity Switch (***Configuration→UNIT→RH.SW***) set to 1 for use of a normally open switch or 2 for normally closed switch. The switch is wired to field connection terminal board terminals labeled HUMDISTAT. Set RH Sensor on OAQ Input (***Configuration→UNIT→RH.S***) to Yes for use of a 4 to 20 mA output RH sensor wired to field connection terminal board (TB) terminals 1 and 4 (for loop powered). RH Sensor Value at 4ma (***Configuration→AIR.Q→H.4M***) sets the % display for a 4mA input from the relative humidity sensor. RH Sensor Value at 20ma (***Configuration→AIR.Q→H.20M***) sets the % display for a 20mA input from the relative humidity sensor.

Dehumidification Demand

When using a humidistat or switch input, the demand for dehumidification is seen as Space Humidity Switch (***Inputs →GEN.I→HUM***) being Low or High. A low value means humidity level is good and a high value means that dehumidification is needed. When using an RH sensor, the demand is based on the Space Humidity Sensor (***Inputs→AIR.Q→SP.RH***) value compared to the Space RH Occupied Setpoint (***Setpoints→RH.SP***) during the occupied period and Space RH Unoccupied Setpoint (***Setpoints → RH.UN***) during unoccupied periods. If the Space Humidity Sensor (SP.RH) value is above the Space RH Setpoint (RH.SP), then dehumidification is needed. If the Space Humidity Sensor (SP.RH) value is below the Space RH Setpoint (RH.SP) minus the Space RH Deadband (***Setpoints→RH.DB***), then dehumidification is no longer needed. If the unit is configured for space sensor control (***Configuration→UNIT →U.CTL = 3***), then the setpoint Reheat Heat SP Deadband (***Setpoints→RH.HB***) applies. This configuration sets the offset above the heating set point at which a unit in Reheat2 mode will turn off. This is a protection against over cooling the space and causing a heat demand.

NOTE: When there is a dehumidification demand, the economizer damper position is limited to it's minimum damper position (***Operating Mode→ECON→EC.MP***).

Reheat Modes

Dehumidification (reheat) is a cooling mode function. Refer to Cooling Operation for cooling mode control. With Humidi−MiZer units there are three additional HVAC Mode (HVAC) expanded texts available for the user: Reheat1, Reheat2, and Reheat1/Reheat2. Selection of the reheat mode for each refrigerant circuit is determined by the dehumidification demand and the cooling demand. Table 10 shows the corresponding circuit mode and output status for the different demand combinations. Units with multiple circuits can operate with a combination of Reheat1 and Reheat2 circuits, as determined by the amount of space cooling demand. See Appendix B for complete tables of unit operation response to thermostat and humidity inputs.

NOTE: Compressor staging control for Humidi−MiZer units requires that circuit A always operates when either circuits B or C are on. This applies to normal operation, service test, and for control alarm responses. This operation difference is required due to the fact that the Motormaster outdoor fan control senses circuit A only.

Operation of the revised refrigerant circuit for each mode is described below.

NOTE: x = refrigerant circuit A, B, or C

Normal Cooling

For 48/50PG03−16 units, refrigerant flows from the outdoor condenser through the normally open Cooling Valve (CV.x) to the expansion device. Reheat1 Valve (RH1.x) and Reheat2 Valve (RH2.x) are closed. (See Fig. 9.)

For 48/50PG20−28 and 48/50PM16−28 units, refrigerant flows from the outdoor condenser through the de−energized 3−way valve (RH.x) to the expansion device. Reheat2 Valve (RH2.x) is closed. (See Fig. 12.)

Reheat 1 (Subcooling Mode)

This mode increases latent cooling and decreases sensible cooling compared to normal cooling.

For 48/50PG03−16 units, refrigerant flows from the outdoor condenser, through the normally open Reheat 1 Valve (RH1.x), and through the reheat condenser coil to the expansion device. Cooling Valve (CV.x) and Reheat2 Valve (RH2.x) are closed. (See Fig. 10.)

For 48/50PG20−28 and 48/50PM16−28 units, refrigerant flows from the outdoor condenser, through the energized 3−way Valve (RH1.x), and through the reheat condenser coil to the expansion device. Cooling Reheat2 Valve (RH2.x) is closed. (See Fig. 13.)

Reheat 2 (Hot Gas Reheat Mode)

This mode provides maximum latent cooling with little to no sensible capacity. This mode can operate to provide dehumidification when there is no cooling demand. Similar to Reheat 1 mode, refrigerant flows from the outdoor condenser, through the normally open Reheat 1 Valve (RH1.x), or through the energized 3−way valve (RH.1x), and through the reheat condenser coil to the expansion device. Reheat2 Valve (RH2.x) is open which provides some compressor discharge gas to the reheat condenser to further increase the reheat of the evaporator air stream (See Fig. 11 or 14 based on unit and size).

NOTE: Humidi−MiZer outdoor fan configurations are dependent on the specific unit and should not be changed. The configurations are provided in case a field replacement of a control board occurs and the settings need to be checked or manually configured. See Appendix A for range and defaults.

Table 10 – Control Modes with Humidi–MiZer™ System
Output and Valve States versus Circuit Mode .x = Circuit A, B, or C identifier

DEMAND AND MODE			OUTPUTS				48/50PG03–16 VALVES			48/50PG20–28 48/50PM16–28 VALVES	
Space Humidity	Circuit Cooling Demand	Circuit Mode	Indoor Fan (IDF)	Circuit Compressor (CMP.x)	Cooling–Reheat Control (CRC)*	Reheat2 Valve (RH2.x)	CV.x Valve 2–way	RH1.x Valve 2–way	RH2.x Valve 2–way	RH1.x Valve 3–way	RH2.x Valve 2–way
—	—	No power	OFF	Off	Off	Off	Off (open)	Off (open)	Off (closed)	Off	Off (closed)
Low	No	Off	Per Ventilation Control	Off	Off	Off	Off (open)	On (closed)	Off (closed)	Off	Off (closed)
Low	Yes	Cool	On	On	Off	Off	Off (open)	On (closed)	Off (closed)	Off	Off (closed)
High	Yes	Reheat1	On	On	On	Off	On (closed)	Off (open)	Off (closed)	On	Off (closed)
High	No	Reheat2	On	On	On	On	On (closed)	Off (open)	On (open)	On	On (open)

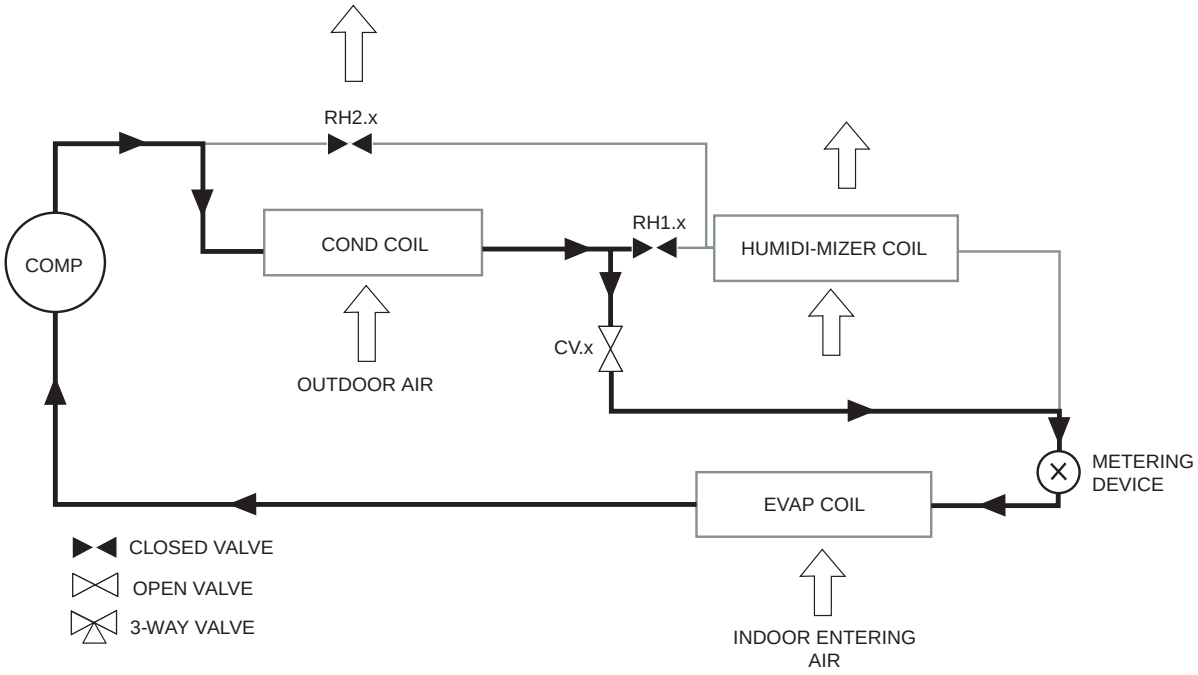


Fig. 9 – Normal Cooling Mode — Humidi–MiZer™ System 48/50PG03–16

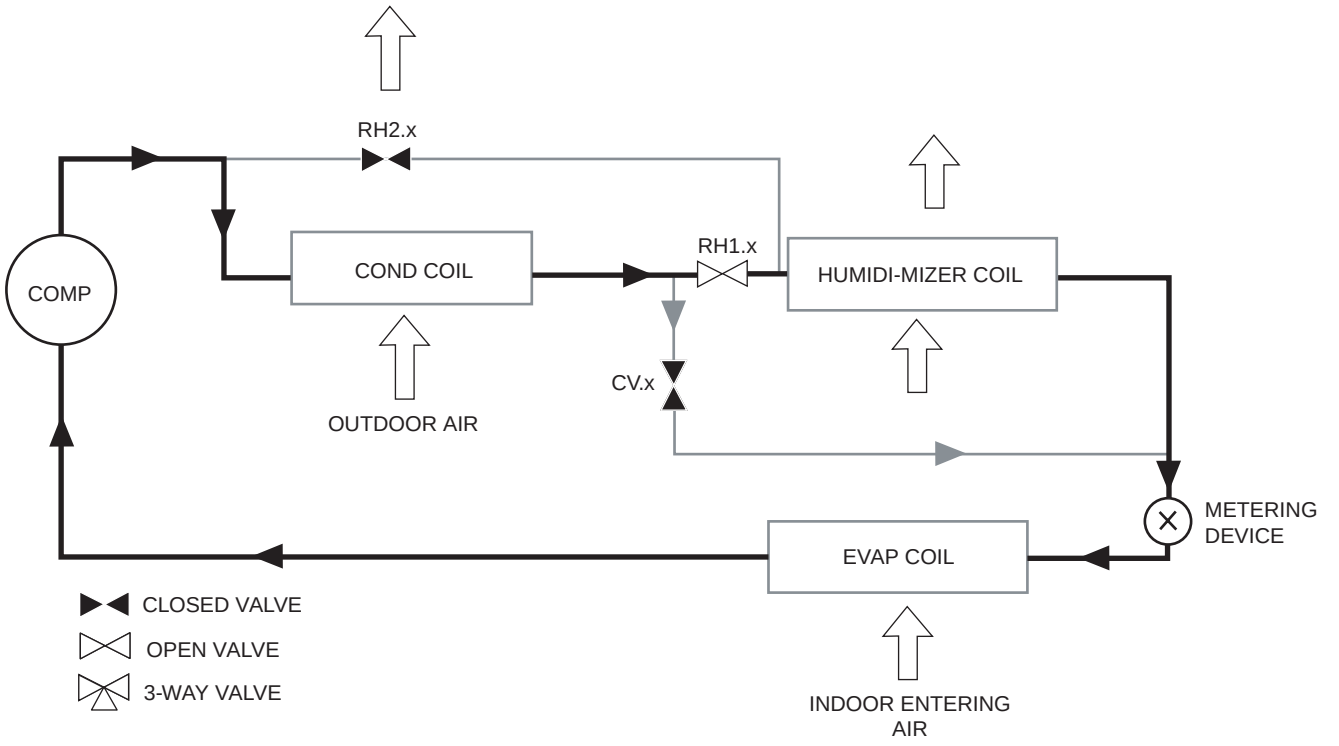


Fig. 10 – Subcooling Mode (Reheat1) — Humidi–MiZer™ System 48/50PG03–16

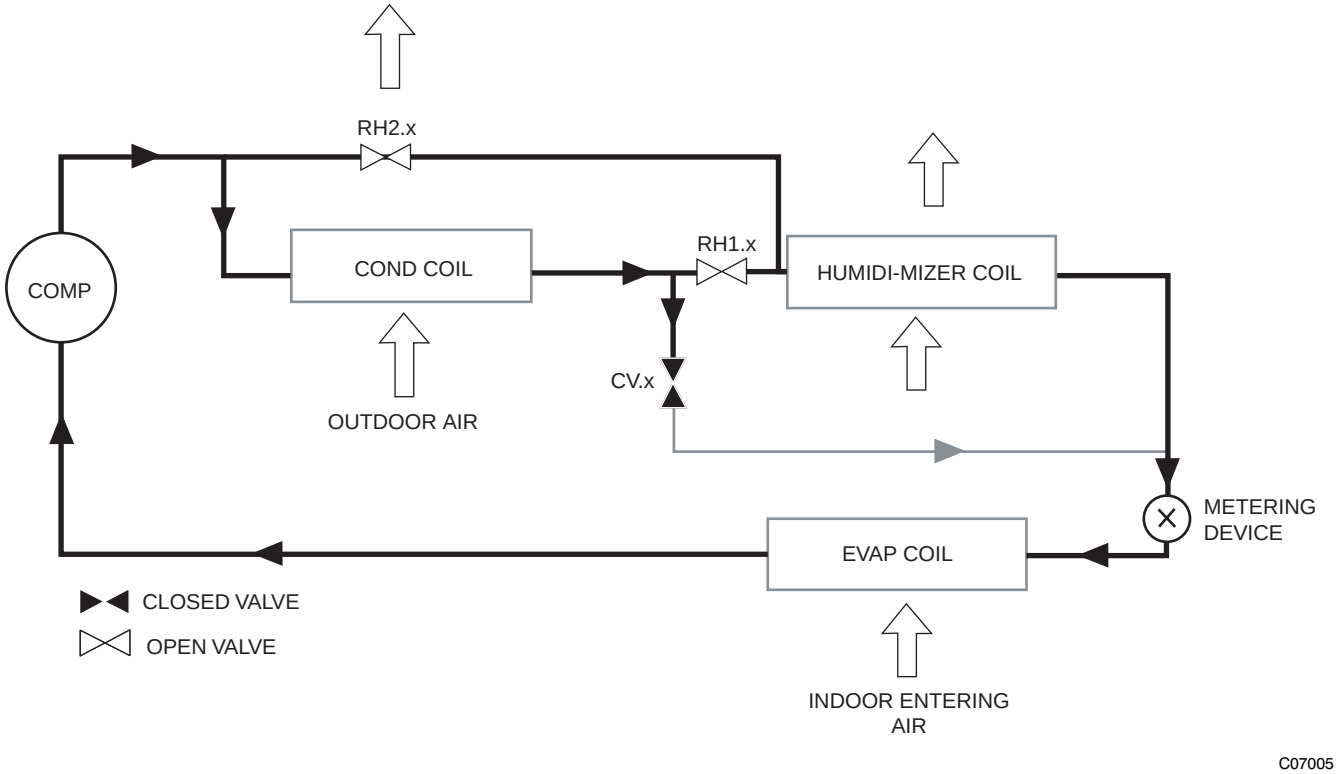


Fig. 11 – Hot Gas Reheat Mode (Reheat2) — Humidi–MiZer System 48/50PG03–16

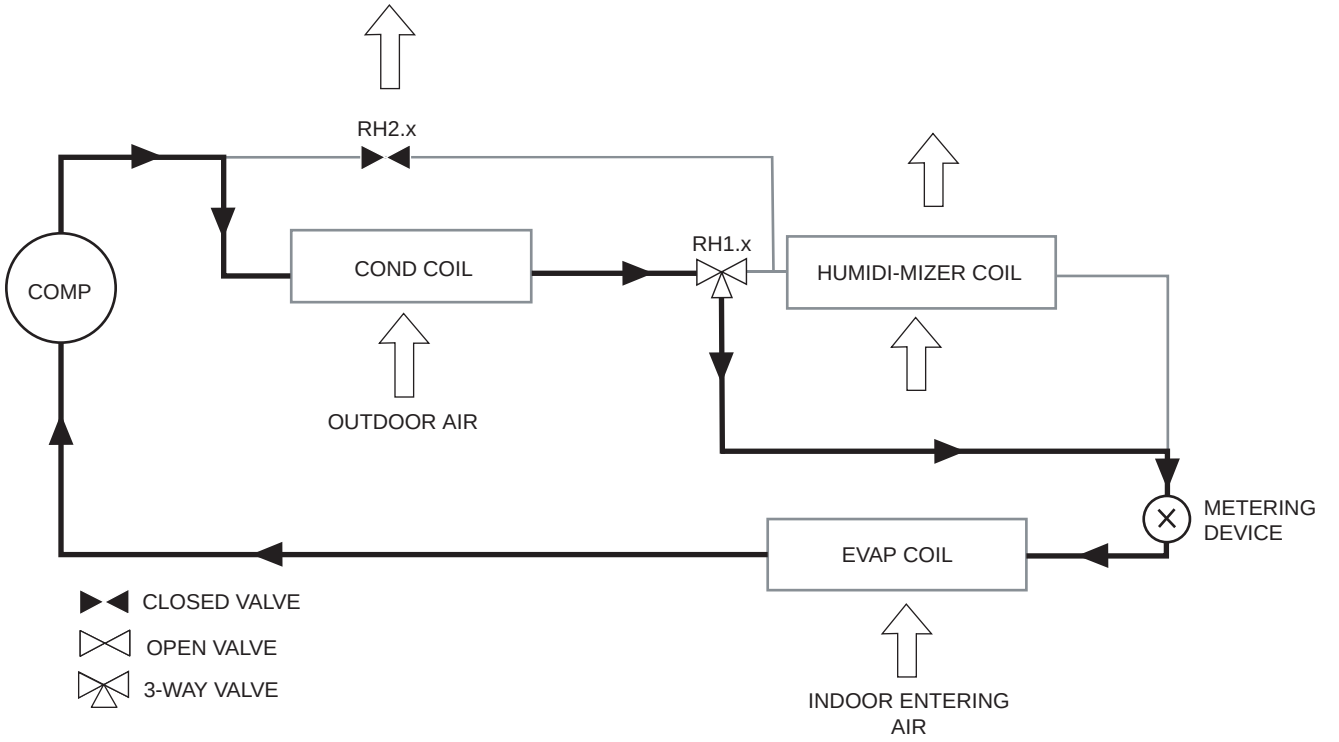


Fig. 12 – Normal Cooling Mode — Humidi–MiZer™ System 48/50PG20–28 and 48/50PM16–28

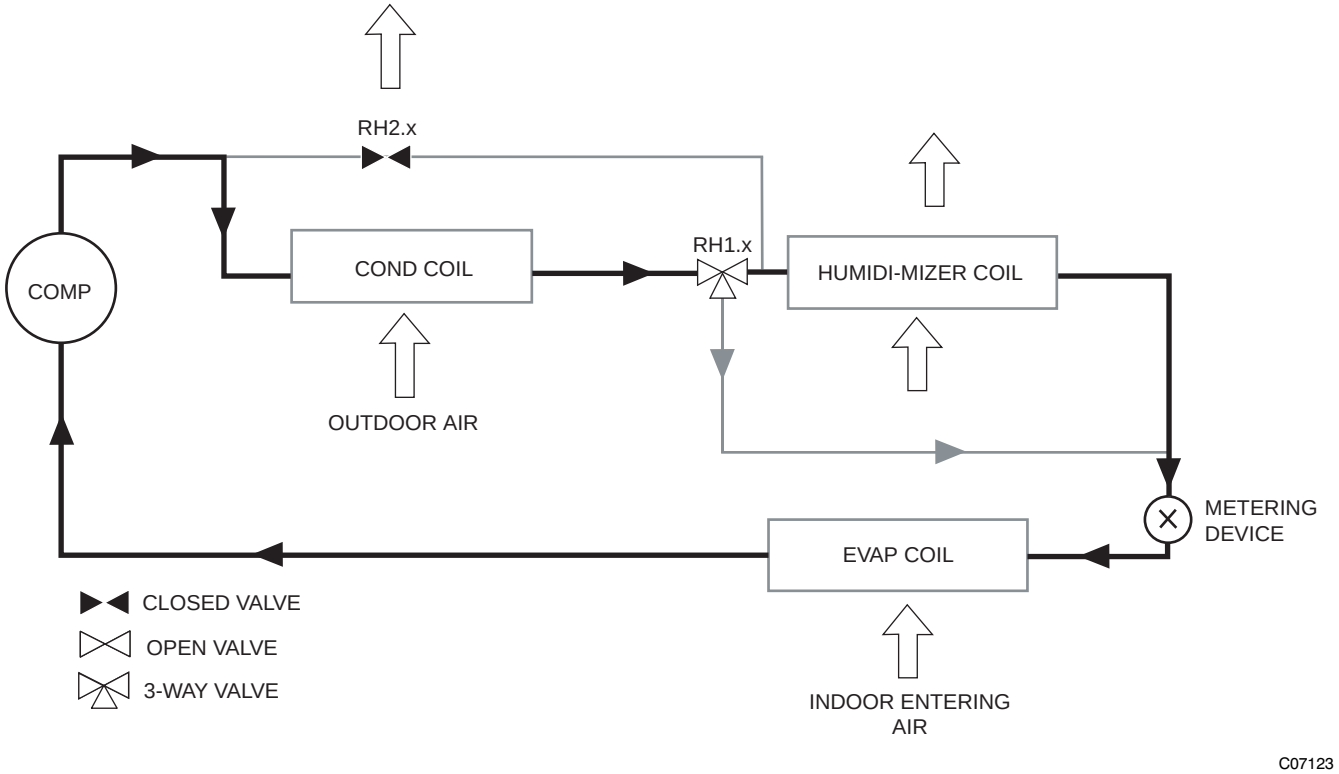


Fig. 13 – Subcooling Mode (Reheat1) — Humidi–MiZer System 48/50PG20–28 and 48/50PM16–28

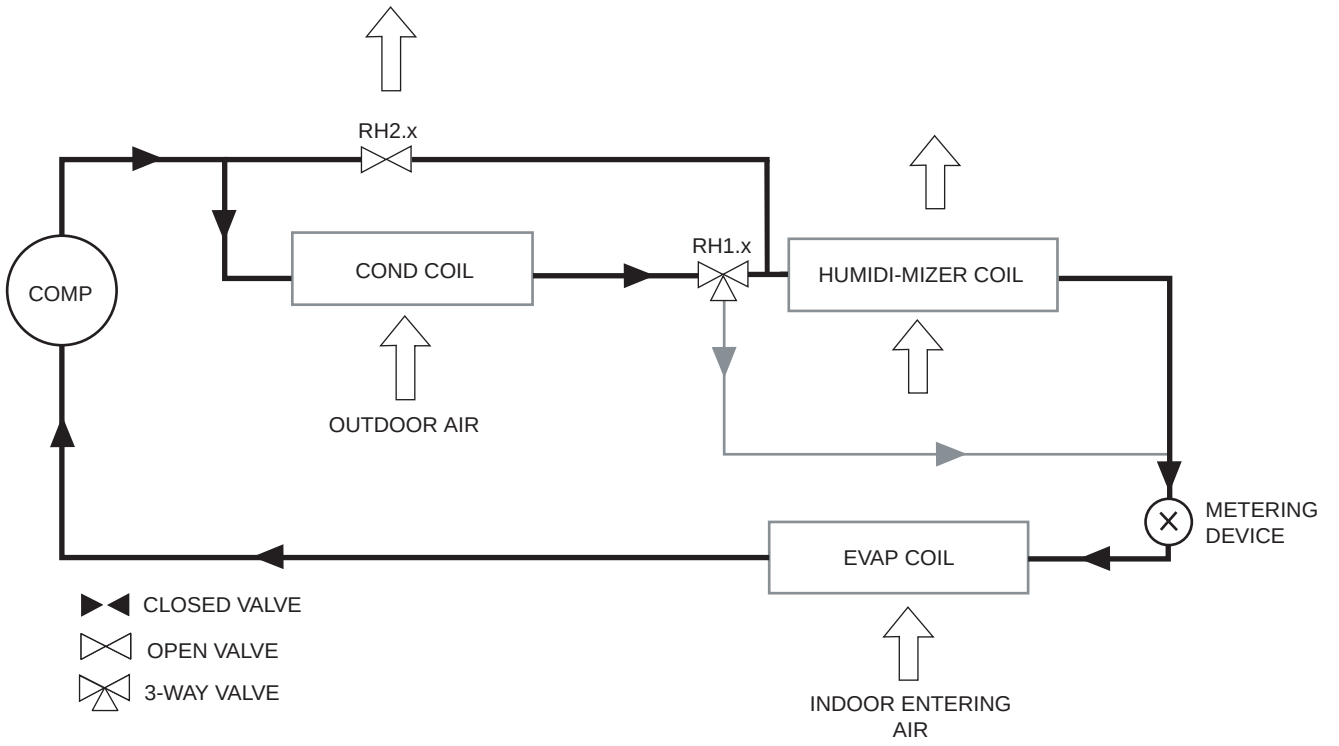


Fig. 14 – Hot Gas Reheat Mode (Reheat2) — Humidi–MiZer™ System 48/50PG20–28 and 48/50PM16–28

Reheat Control

The cooling staging and compressor control routines are responsible for controlling each circuit in one of the three sub–modes (Cool, Reheat1, or Reheat2). When there is only a cooling demand, one or more circuits will operate in normal cooling mode. When there is only dehumidification demand, all circuits will operate in Reheat2 mode. When there is both cooling demand and dehumidification demand, all circuits will operate in either Reheat1 or Reheat2 mode, with the portion of Reheat1 circuits determined from the cooling demand. The Requested Reheat2 Stages (***Operating Modes→COOL→HMZR→REQ.R***) shows the control's request for reheat circuits if cooling is not already requesting all stages. Available Reheat2 Stages (***Operating Modes→COOL→HMZR→AVL.R***) displays circuits that are available for reheat use. Actual Reheat2 Stages (***Operating Modes→COOL→HMZR→ACT.R***) displays the current number of circuits running in Reheat2 mode. These three status points should only be monitored when there is only a dehumidification demand, because their values can be forfeited to cooling stages when cooling demand is present. Reheat2 Stage Incr. Time (***Configuration→HMZR →R.INC***) and Reheat2 Stage Decr. Time (***Configuration→HMZR→R.DEC***) set the time delay when adding or subtracting a compressor for a reheat function. These only apply when using adaptive thermostat or space sensor control. There are three relay outputs that show reheat status. Cool – > Reheat1 Control (***Outputs→COOL→CRC***) show when the unit has switch from pure cooling to reheat ready (based on a dehumidification demand). Reheat2 Valve A (***Outputs→COOL→RH2.A***) and Reheat2 Valve B,C (***Outputs→COOL→RH2.B***) display when the respective circuit's Reheat2 valve is energized.

A circuit can be restricted from Reheat2 operation by the outside temperature and saturated suction temperature. Reheat2 OAT Limit A (***Configuration→HMZR→RA.LO***) and Reheat2 OAT Limit B,C (***Configuration→HMZR→RB.LO***) set the lowest outside temperature the respected circuit is allowed to run in reheat2 mode. The lockout on/off status is shown as Reheat2 OAT Lockout A (***Operating Modes→COOL→HMZR→R.LO.A***) and Reheat2 OAT Lockout B,C (***Operating Modes→COOL→HMZR →R.LO.B***) for their respective circuit. If a circuit's saturated suction pressure falls below the low limit configuration during Reheat2 operation, the circuit will switch to reheat1 (the circuits Reheat2 valve will be turned off) for at least 2 minutes and until its suction rises back above the high limit. Reheat2 SSP Lo Limit A (***Configuration→HMZR→RA.LP***) and Reheat2 SSP Lo Limit B,C (***Configuration→HMZR→RB.LP***) set the low pressure limit for Reheat2 mode for individual circuits. Reheat2 SSP Hi Limit A (***Configuration→HMZR→RA.HP***) and Reheat2 SSP Hi Limit B, C (***Configuration→HMZR→RB.HP***) set the high pressure limit for Reheat2 mode for each circuit.

Reheat Outdoor Fan Control

On specific units, the outdoor fans are controlled differently while in a reheat mode versus just cooling mode. If Reheat Fan Control (***Configurations → HMZR → RH.FN***) is set to yes, reheat fan control is enabled and anytime the unit is running reheat it will use the following logic to control the outdoor fans.

During reheat fan control, the outdoor fans will start and stay at level 1 until the Reheat ODF Fan On Temp (***Configurations → HMZR → RF.ON***) is reached. When the outdoor air temperature is above this reheat fan on temperature, the outdoor fans will change to the Reheat ODF Fan On Level (***Configurations → HMZR → RF.LV***). The fans will stay at this level until the Reheat ODF Fan Off Temp (***Configurations → HMZR → RF.OF***) is reached. When the outdoor temperature drops below the reheat fan off temperature, the outdoor fans will change back to level 1. Reheat fan control will cease if at any time the unit stops running reheat and shuts off or switches to just cooling. At this time the fans will either stay off or run under normal fan control.

Reheat Mode Diagnostic Help

The status of reheat mode sensor inputs may be viewed within the display Inputs menu. The status of reheat mode outputs may be viewed within the display Outputs or ***Run Status→COOL*** menus. Additional diagnostic help, including status of circuit reheat temperature limit lockouts may be viewed within the Humidi-MiZer™ sub-menu of the cooling mode diagnostic table at ***Operating Modes→COOL→HMZR***.

The Service Test mode may be used to force the system to operate in various stages of Reheat1 or Reheat2 mode, or to independently operate the reheat valve control outputs. Fig. 15–19 show the valve locations of Humidi–MiZer equipped units.

The following forced operating states are changed or added to the available service test operation for a Humidi-MiZer equipped unit:

Service Test→*COOL→CMP.A* (Cool A Test)

A value of On will turn on circuit A in Normal Cooling mode.

Service Test→*COOL→CMP.B* (Cool B Test)

A value of On will turn on circuits A and B in Normal Cooling mode.

Service Test→COOL→CMP.C (Cool C Test)

A value of On will turn on circuits A and C in Normal Cooling mode.

Service Test→HMZR→RH1.A (Reheat1 A Test)

A value of On will turn on circuit A in Reheat1 mode.

Service Test→HMZR→RH1.B (Reheat1 B Test)

A value of On will turn on circuits A and B in Reheat1 mode.

Service Test→HMZR→RH1.C (Reheat1 C Test)

A value of On will turn on circuits A and C in Reheat 1 mode.

Service Test→HMZR→RH2.A (Reheat2 A Test)

A value of On will turn on circuit A in Reheat2 mode.

Service Test→HMZR→RH2.B (Reheat2 B, C Test)

A value of On will turn on circuits A B and C in Reheat2 mode.

Service Test→HMZR→CRC (Cool-Reheat1 Valve Test)

For 48/50PG03–16 units, a value of On will turn on the CRC relay. This will turn on CV.x valves and turn off RH1.x valves.

For 48/50PG20–28 and 48/50PM16–28 units, a value of On will turn on the CRC relay. This will energize RH.1 and RH.B.

Service Test→HMZR→RHV.A (Reheat2 Valve A Test)

A value of On will turn on the RH2.A valve.

Service Test→HMZR→RHV.B (Reheat2 Valve B,C Test)

A value of On will turn on the RH2.B and RH2.C valves.

Service Test→Fans→OFC.1 (Outdoor Fan 1 Test)

For 48/50PG03–14: not used. For 48/50PG16 only: a value of On will turn on the OFC relay only which controls status of fans 1 and 3; but fans are not powered unless compressor A contactor is on. For 48/50PG20–28 and 48/50PM16–28: Turning on OFC1, provides power to the Motormaster controller. Outdoor fans 1 and 4 will operate under the control of the Motormaster controller.

Service Test→Fans→OFC.2 (Outdoor Fan 2 Test)

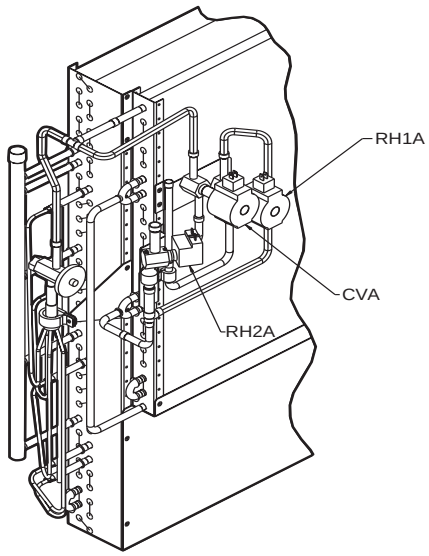
For 48/50PG03–16: Not used. For 48/50PG20–28 and 48/50PM16–28: Turn on OFC2. Outdoor fans 2, 3, 5, and 6 will operate.

Service Test→Fans→OFC.3 (Outdoor Fan 1 Test)

Not used.

Service Test→INDP→CCH (Crankcase Heat Test)

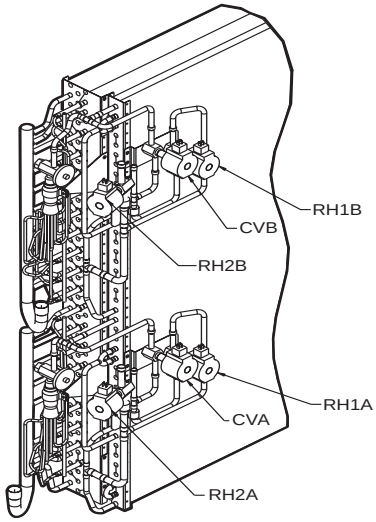
Not used. Compressor crankcase heaters are wired directly to line power.



LEGEND
CV -- Cooling Valve
RH -- Reheat Valve

C07007

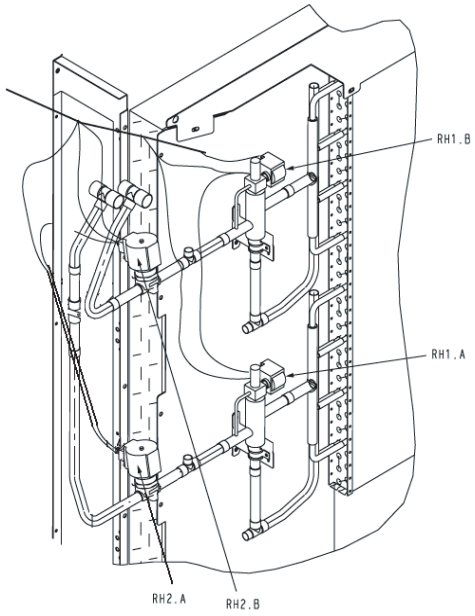
Fig. 15 – Humidi–MiZer™ System Valve Locations 48/50PG03–07



LEGEND
CV -- Cooling Valve
RH -- Reheat Valve

C07006

Fig. 16 – Humidi–MiZer™ System Valve Locations 48/50PG08–14



C08057

Fig. 17 – Humidi–MiZer System Valve Locations 48/50PM16–28

Air Baffles

The units with Humidi-MiZer™ option are equipped with Motormaster® control to maintain adequate discharge pressure for proper unit operation during low ambient operation. This becomes especially critical in the Reheat2 mode of operation. Wind could have a detrimental effect depending on the orientation and the expected design latent load of the space. If the unit is oriented with the vertical condenser coil toward the prevailing wind, then the field-fabricated wind baffles are required. If the unit is not oriented as described above, but there is expected long operational periods in the Reheat2 mode, then the field-fabricated wind baffles are recommended. See Fig. 18 or 19 for dimensions of the field-fabricated wind baffles.

Indoor Air Quality (IAQ)

The *Comfort*Link™ control has the capability for several methods of demand ventilation control. Indoor air quality is typically measured using a CO_2 sensor whose measurements are displayed in parts per million (ppm). Outdoor air quality may be measured with a CO_2 sensor for indoor-outdoor differential demand ventilation control, or with other sensor types for the outdoor air lockout function. The factory-installed indoor air quality CO_2 sensor is mounted in the return section. A field-installed indoor air quality CO_2 sensor may be mounted in the return or directly in the occupied space, per job requirements. The indoor air quality modes of operation can be affected by configurations for indoor air quality sensor (***Configuration→AIR.Q→IA.CF***), indoor air quality switch (***Configuration→AIR.Q→II.CF***), outdoor air quality sensor (***Configuration→AIR.Q→OA.CF***) and other related fan and limit configurations as described below.

IAQ (Analog Input)

The *Comfort*Link control is configured for indoor air quality sensors which provide 4 to 20 mA for 0 to 2000 ppm. If a sensor has a different range, the ppm display range must be reconfigured by entering new values for ***Configuration→AIR.Q→I.4M*** and ***Configuration→AIR.Q→I.20M***.

IA.CF = 0 (No IAQ)

IA.CF* = 0** signifies that there is no IAQ sensor installed. The damper will operate at the ***Configuration→AIR.Q→EC.MN position when the space is occupied and the indoor fan is on.

IA.CF = 1 (DCV)

When ***IA.CF* = 1**, the IAQ algorithm is set for Demand Control Ventilation (DCV). During DCV, the damper modulates between two user configurations depending upon the relationship between the IAQ and the Outdoor Air Quality (OAQ). The lower of these two positions is referred to as the Minimum IAQ Damper Position (***Configuration→AIR.Q→AQ.MN***) while the higher is referred to as Economizer Minimum Position (***EC.MN***). The ***AQ.MN*** should be set to an economizer position that brings in enough fresh air to remove contaminants and CO_2 generated by sources other than people. The ***EC.MN*** should be set to an economizer position that brings in enough fresh air to remove contaminants and CO_2 generated by all sources including people. The ***EC.MN*** value is the design value for maximum occupancy.

The *Comfort*Link control will begin to open the damper from the ***AQ.MN*** position when the IAQ level begins to exceed the Outdoor Air Quality (OAQ) level by a configurable amount. This amount is referred to as AQ Differential Low (***Configuration→AIR.Q→AQD.L***). When the differential between IAQ and OAQ reaches AQ Differential High (***Configuration→AIR.Q→AQD.H***), the economizer position will be ***EC.MN***. When the IAQ/OAQ differential is between ***AQD.L*** and ***AQD.H***, the control will modulate the damper between **AQ.MN** and **EC.MN** in a linear manner as shown in Fig. 20. The damper position will never exceed the bounds specified by ***AQ.MN*** and ***EC.MN*** during IAQ control.

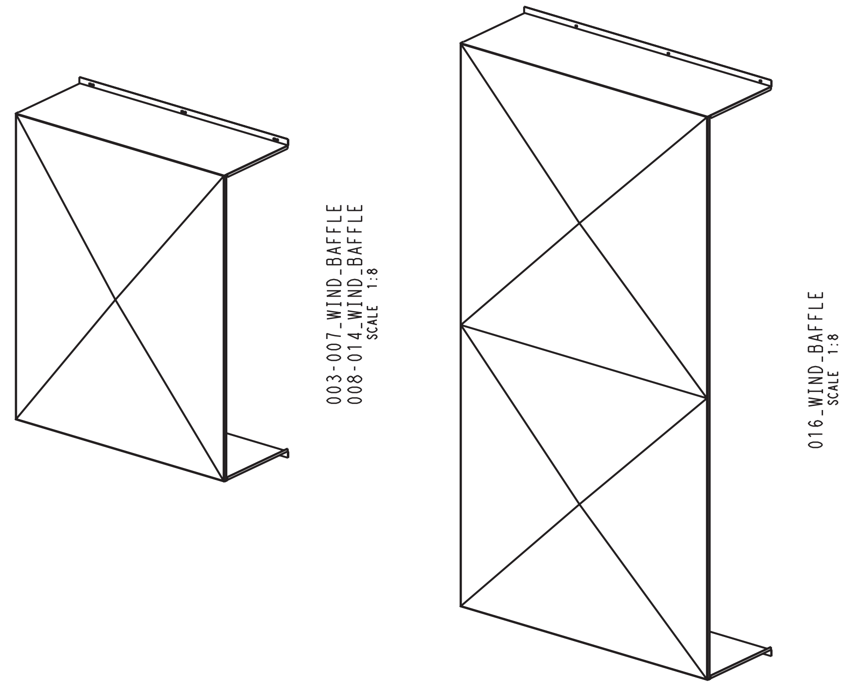
IA.CF = 2 (Override IAQ)

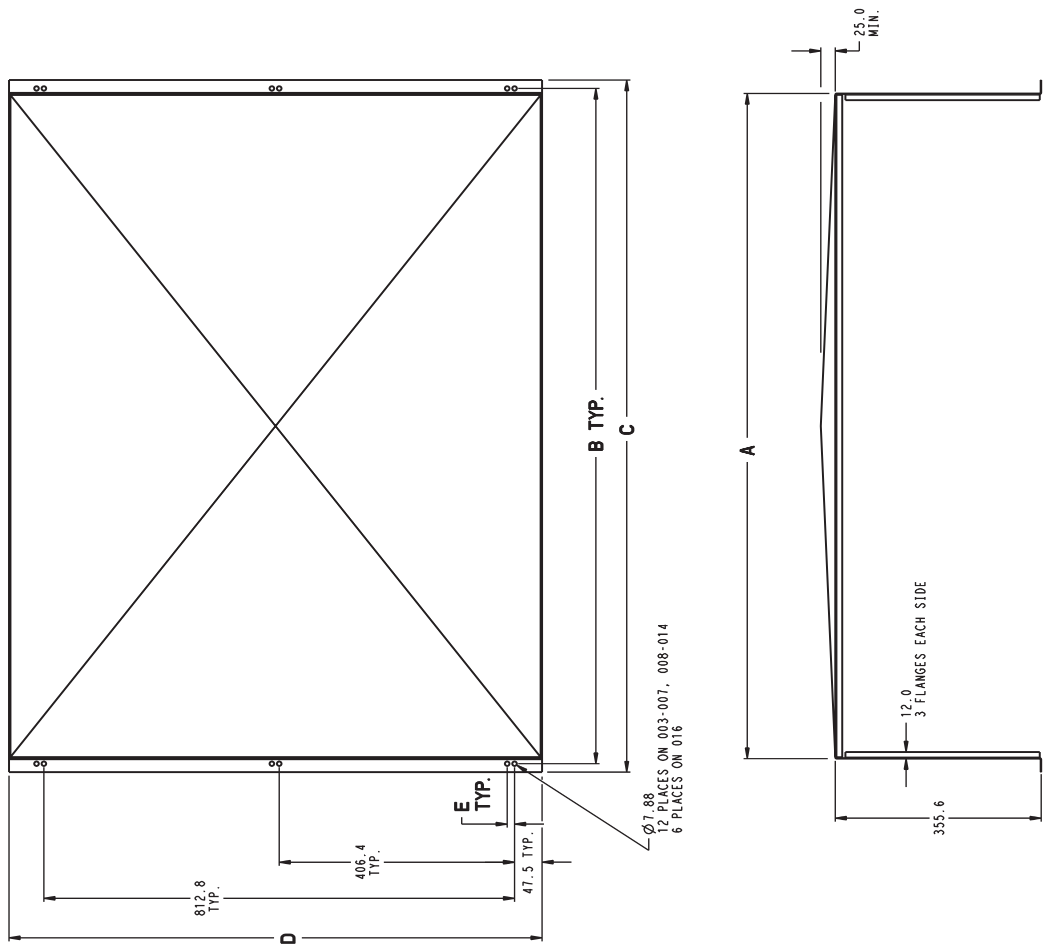
When ***IA.CF* = 2**, the IAQ algorithm maintains the damper at ***Configuration →AIR.Q→EC.MN*** until the override condition triggers. The override triggers when the IAQ/OAQ differential is greater than ***Configuration→AIR.Q→AQD.H***. The override position is ***Configuration→AIR.Q→OVR.P*** (Economizer Override Position). The economizer position will return to ***EC.MN*** when the IAQ/OAQ differential is less than ***Configuration →AIR.Q→AQD.L***.

The Override algorithm will operate whenever the building is occupied and the indoor fan is operating or whenever the IAQ algorithm has caused the indoor fan to operate. The configuration ***IA.FN*** determines whether or not the IAQ algorithm can turn on the indoor fan.

If the indoor fan is not operating, the economizer position will be zero. If the override is not active and the building is unoccupied, the economizer position will be zero. The damper position may exceed ***Configuration→AIR.→EC.MN*** or ***Configuration→AIR.Q→OVR.P*** to provide economizer cooling.

PART NO.	A	B	C	D	E
003-007_WIND_BAFFLE	1191.8	1209.9	1240.0	920.5	12.7
008-014_WIND_BAFFLE	1430.4	1448.5	1478.6	1090.5	12.7
016_WIND_BAFFLE	2193.4	2211.5	2241.6	1090.5	0.0





C07009

Fig. 18 − Air Baffle Dimensions
48/50PG03−16

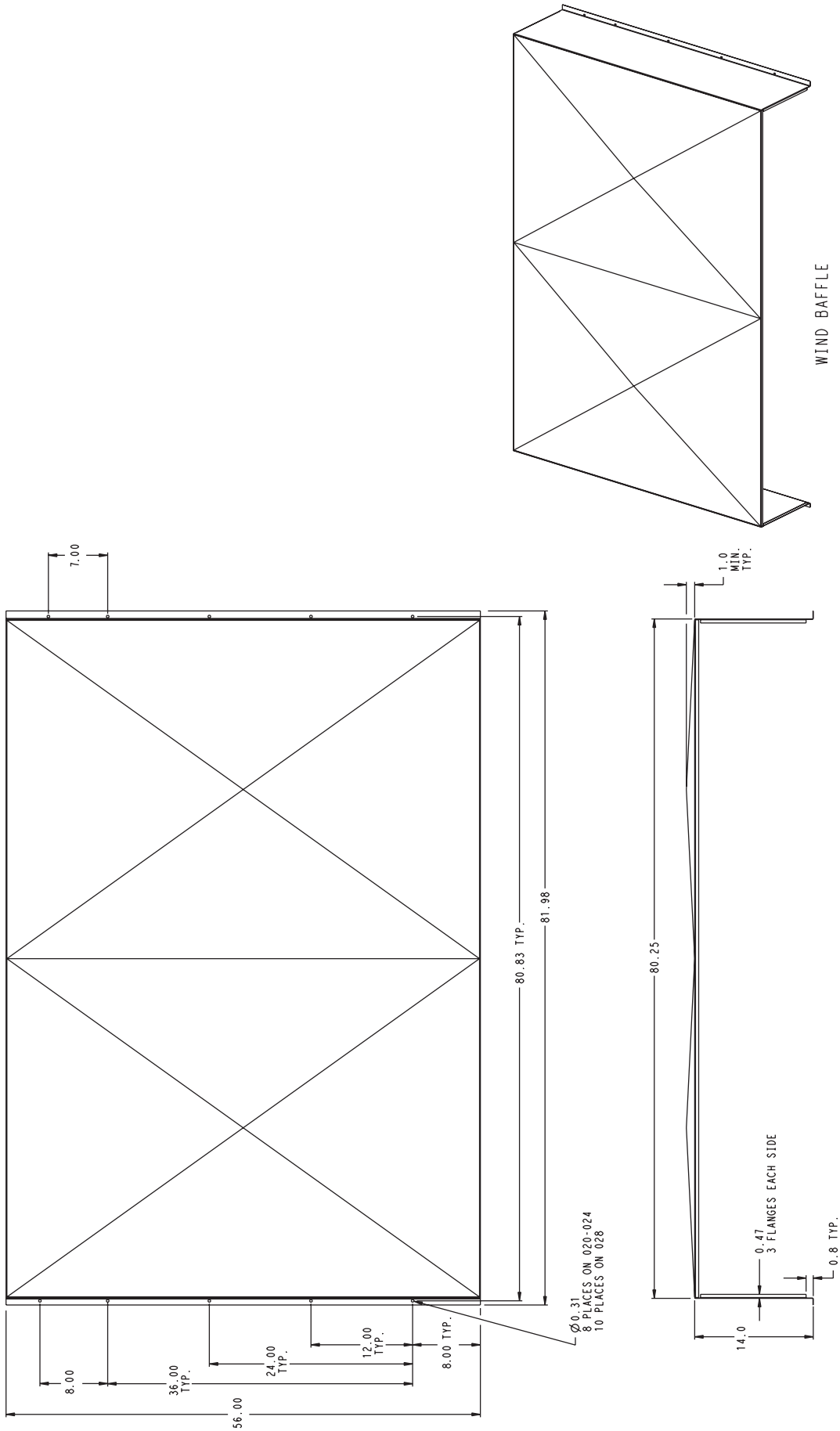


Fig. 19 – Air Baffle Dimensions
48/50PM16–28

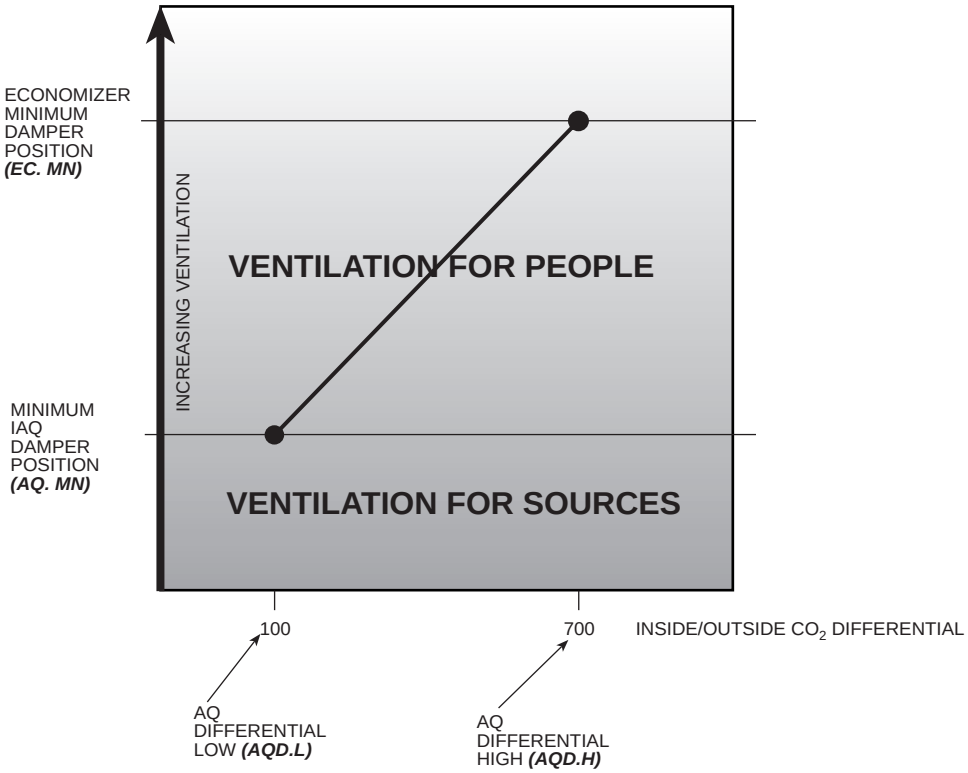


Fig. 20 – IAQ Control

IA.CF = 3 (Control Minimum Position)

When ***IA.CF* = 3**, an external 4 to 20 mA source is used to set the minimum position. The 4 mA signal corresponds to 0% and the 20 mA signal corresponds to 100%. In this mode, configurations such as ***Configuration→AIR.Q→EC.MN*** and ***Configuration→AIR.Q→AQ.MN*** are not used.

If the indoor fan is not operating, the economizer position will be zero. The damper position may exceed the economizer minimum position to provide economizer cooling.

IAQ (Switch Input)

Indoor air quality can also be measured using a switch input. For the purpose of specifying the type of switch input, low CO_2 levels are considered normal. The IAQ switch input is defined by the configuration by ***Configuration→AIR.Q→II.CF*** IAQ Level (Switch Input). Enthalpy and IAQ are controlled by the same switch input and therefore they cannot be used simultaneously.

II.CF = 0 (No IAQ)

The ***II.CF* = 0** configuration signifies that there is no IAQ switch input. The damper will operate at the ***EC.MN*** position when the space is occupied and the indoor fan is on.

II.CF = 1 (DCV NO) or II.CF = 2 (DCV NC)

The Demand Control Ventilation (DCV) allows the economizer minimum position to be decreased when there is no IAQ problem. If IAQ is low, the economizer minimum position is Minimum IAQ Damper Position (***Configuration→AIR.Q→AQ.MN***). If IAQ is high, the economizer minimum position is the Economizer Minimum Position (***Configuration→AIR.Q→EC.MN***).

II.CF = 3 (Override NO) or II.CF = 4 (Override NC)

The damper override function permits absolute positioning of the economizer damper for ventilation purposes. The override is active when IAQ is high and inactive when IAQ is low. The override position is configurable by the configuration by ***Configuration →AIR.Q→OVR.P*** (Economizer Override Position).

Outdoor Air Quality (Analog Input)

The *Comfort*Link™ control is configured for outdoor air quality sensors which provide 4 to 20 mA for 0 to 2000 ppm. If a sensor has a different range, the ppm display range must be reconfigured by entering new values for ***Configuration→AIR.Q →O.4M*** and ***Configuration→AIR.Q→O.20M***.

OA.CF = 0 (No OAQ)

This signifies there is no outdoor air sensor installed. The default value of ***OAQ*** is 400 ppm.

OA.CF = 1 (DCV)

The outdoor air quality sensor analog input is for the value of ***OAQ*** during demand control ventilation operation.

OA.CF = 2 (OAQ Lockout)

The outdoor air quality sensor analog input is only used to lock out the outdoor ventilation. The economizer commanded position is set to 0% when the ppm exceeds the OAQ lockout value configured for ***Configuration→AIR.Q→OAQ.L***. The default value of ***OAQ.L*** is 600 ppm.

Fan Enable (Analog IAQ Sensor)

The DCV algorithm will operate whenever the building is occupied and the indoor fan is operating or whenever the IAQ algorithm has caused the indoor fan to operate. The configuration ***Configuration→AIR.Q→IA.FN*** (Fan Enable for IAQ), determines whether or not the IAQ algorithm can turn on the indoor fan. If the indoor fan is not operating, the economizer position will be zero. The damper position may exceed ***Configuration→AIR.Q→EC.MN*** to provide economizer cooling.

IA.FN = 0 (Never)

When ***IA.FN = 0***, the IAQ algorithm can never turn on the fan.

IA.FN = 1 (Occupied)

When ***IA.FN* = 1**, the IAQ algorithm will turn on the indoor fan whenever the building is occupied and IAQ/OAQ differential is greater than the configuration ***Configuration→AIR.Q→ DF.ON*** (Fan On AQ Differential). The indoor fan will turn off when the IAQ/OAQ differential is less than the configuration ***Configuration→AIR.Q→DF.OF*** (Fan Off AQ Differential).

IA.FN = 2 (Always)

The indoor fan performance for ***IA.FN* = 2** is the same as the performance when ***IA.FN* = 1** except the algorithm is not limited to occupied periods only. The fan can be triggered on when the space is occupied or unoccupied.

Fan Enable (Switch Input)

The DCV algorithm will operate whenever the building is occupied and the indoor fan is operating or the whenever the IAQ algorithm has caused the indoor fan to operate. The configuration ***Configuration→AIR.Q→II.FN*** (IAQ Switch Input Fan CFG) determines whether or not the IAQ algorithm can turn on the indoor fan. If the indoor fan is not operating, the economizer position will be zero. The damper position may exceed ***Configuration→AIR.Q→EC.MN*** to provide economizer cooling.

II.FN = 0 (Never)

When ***II.FN* = 0**, the IAQ algorithm can never turn on the fan.

II.FN = 1 (Occupied)

When ***II.FN* = 1**, the IAQ algorithm will turn on the indoor fan whenever the building is occupied and IAQ is high. The indoor fan will turn off if IAQ returns to normal.

II.FN = 2 (Always)

The indoor fan performance for ***II.FN* = 2** is the same as the performance when ***II.FN* = 1** except the algorithm is not limited to occupied periods only. The fan can be triggered on when the space is occupied or unoccupied.

EnergyX

For units equipped with the EnergyX factory installed option, there will be an EnergyXv2 Supplement Installation Instructions in the unit's information packet. Refer to this supplement for details on how the ERV operates relative to the base unit.

Adaptive Fan

The Adaptive Fan Option is a new method of controlling the supply fan in a typical constant volume rooftop unit. This control method employs a Variable Frequency Drive (VFD) to operate the supply fan at different speeds in order to achieve energy savings through reduced fan power. This method is specifically **not** concerned with controlling static pressure in the supply duct, but rather with setting different fan speeds for different operating conditions, such as ventilation mode or part−load mechanical cooling. This option should not be confused with a linearly variable VFD concept − the different speeds are pre−programmed per condition; there is no linear−modulation of fan speed. Adaptive Fan is enabled by setting Adaptive Fan Operation to yes, (***Configuration→A.FAN→AF.EN* = *Yes***).

The adaptive fan function is NOT a Variable Air Volume (VAV) function. The fan adapts its speed to one of nine based on mode and current state to satisfy a demand. The nine speeds consist of two hard coded values and seven configurable values. The two hard coded values are 0% (or OFF) and 100%. The seven configurable fan speeds are: Ventilation (FS.VN), IAQ Override (FS.AQ), Free Cool Lo (FS.E1), Free Cool Hi (FS.E2), Mech Cooling (FS.CL), Heating (FS.HT), and Reheat2 (FS.RH).

The VFD is powered by the indoor fan contactor and is always on unless the unit is in test mode. When the thermostat or space sensor control conditions require the fan on, the VFD will then ramp to desired speed. Fan speed is always calculated by evaluating the current applicable conditions. Each fan speed "mode" is evaluated independently, and the highest fan speed is used. For example, if an IAQ Override event occurs during Ventilation mode, the fan speed is set to the higher of the two (FE.VN or FS.AQ)

NOTE: Adaptive Fan operation and Analog economizer actuator operation are mutually exclusive because they both use the AO1 output on the ECB. Priority is given to Adaptive Fan, so if the unit is configured for Adaptive Fan (***Configuration→A.FAN→AF.EN* = *Yes***), the software will automatically set the actuator control method to digital (***Configuration→ECON→E.CTL* = 1** (DIG/POSITION).

Fan Speed – Ventilation (FS.VN)

This configuration defines the fan speed used in Ventilation (fan−only) mode. Ventilation mode is when the supply fan is running, but there is no demand for heating or cooling.

Fan Speed – IAQ Override (FS.AQ)

This configuration defines the fan speed used when an IAQ Override is active. This pertains only to the Override function of IAQ (***Configuration→AIR.Q→IA.CF = 2***) (Override IAQ) or (***Configuration→AIR.Q→II.CF = 3 or 4***) (Override N/O or N/C), not the DCV or Minimum Position functions.

Fan Speed – Free Cool Lo (FS.E1)

This configuration defines the fan speed used when in Free Cooling at low cool mode. Refer to the Economizer Controls Operation section for details on low cool mode.

Fan Speed – Free Cool Hi (FS.E2)

This configuration defines the fan speed used when in Free Cooling at high cool mode. Refer to the Economizer Controls Operation section for details on high cool mode.

Fan Speed – Mech Cooling (FS.CL)

This configuration defines the intermediate fan speed used when mechanical cooling is being requested. Fan speed is based on how many cooling stages the unit has, how many cooling stages are being requested, and how many reheat stages are being requested. If the unit only has one circuit of cooling, then the fan speed will be 100% whenever that stage is requested. If the unit has more then one circuit of cooling but only one is being requested, the fan speed will be set to FS.CL. Any time more than one stage is requested the fan speed will be set to 100%. On Humidi−MiZer™ equipped units fan speed is more complex. Refer to the FS.RH and Table 11 for details.

Fan Speed – Reheat2 (FS.RH)

This configuration defines the fan speed used when Hot Gas Reheat (reheat2) is being requested. Fan speed is based on how many cooling stages the unit has, how many cooling stages are being requested, and how many reheat stages are being requested. If only reheat stages are being requested, then the fan speed will be set to FS.RH. If the unit only has one circuit of cooling, then the fan speed will be 100% when dehumidification and cooling is being requested. If the unit has more then one circuit of cooling and only one cooling stage is being requested, the fan speed will be set to FS.CL. Any time more then one cooling stage is requested the fan speed will be set to 100%. If only one cooling stage is requested and reheat is requested, then the fan speed will be set to the greater of the two configurations (FS.CL or FS.RH). (See Table 11.)

Fan Speed – Heating (FS.HT)

This configuration defines the intermediate fan speed used when in heating mode. Fan speed is based on how many heating stages the unit has and how many heating stages are actually on. If the unit only has one stage of heat, then the fan speed is set to 100% anytime the heat stage is on. If the unit has more than one stage of heat but only one heat stage is on, then the fan speed will be set to FS.HT. Any time more than one stage of heat is on, the fan speed is set to 100%.

Table 11 – Cooling Fan Speed Determination

Number of Circuits	Cooling Stages Requested	Reheat Stages Requested	HVAC Mode	Fan Speed
1	1	0	Cooling	100%
	1	>0	Reheat1	100%
	0	>0	Reheat2	FS.RH
>1	1	0	Cooling	FS.CL
	>1	0	Cooling	100%
	>1	>0	Reheat1	100%
	1	>0	Reheat1/ Reheat2	FS.CL or FS.RH
	0	>0	Reheat2	FS.RH

Temperature Compensated Start

This logic is used when the unit is in the unoccupied state. The control will calculate early Start Bias time based on Space Temperature deviation from the occupied cooling and heating set points. This will allow the control to start the unit so that the space is at conditioned levels when the occupied period starts. This is required for ASHRAE 90.1 compliance. A space sensor is required for non-linkage applications.

Setting Up the System

The settings for temperature compensated start can be found in the local display under ***Configuration→UNIT***.

ITEM	EXPANSION	RANGE	UNITS	CCN POINT
TCS.C	Temp.Cmp.Strt.Cool Factr	0 - 60	min	TCSTCOOL
TCS.H	Temp.Cmp.Strt.Heat Factr	0 - 60	min	TCSTHEAT

Temp Comp Strt Cool Factr (TCS.C)

This is the factor for the start time bias equation for cooling.

Temp Comp Strt Heat Factr (TCS.H)

This is the factor for the start time bias equation for heating.

NOTE: Temperature compensated start is disabled when these factors are set to 0.

Temperature Compensated Start Logic

The following conditions must be met for the algorithm to run:

- Unit is in unoccupied state.
- Next occupied time is valid.
- Current time of day is valid.
- Valid space temperature reading is available (sensor or CCN network).

The algorithm will calculate a Start Bias time in minutes using the following equations:

If (space temperature > occupied cooling set point)

Start Bias Time = (space temperature – occupied cooling set point)* ***TCS.C***

If (space temperature < occupied heating set point)

Start Bias Time = (occupied heating set point – space temperature)****TCS.H***

When the Start Bias Time is greater than zero the algorithm will subtract it from the next occupied time to calculate the new start time. When the new start time is reached, the Temperature Compensated Start mode is set, the fan is started and the unit controlled as in an occupied state. Once set, Temperature Compensated mode will stay on until the unit goes into the Occupied mode. The Start Bias Time will be written into the CCN Linkage Equipment Table if the unit is controlled in DAV mode. If the Unoccupied Economizer Free Cool mode is active when temperature compensated start begins, the Unoccupied Free Cool mode will be stopped.

NOTE: The maximum minutes Start Bias can be is 180.

Carrier Comfort Network (CCN)® Configuration

It is possible to configure the *Comfort*Link™ control to participate as an element of the Carrier Comfort Network (CCN) system directly from the local display. This section will deal with explaining the various programmable options which are found under the CCN sub-menu in the Configuration mode.

The major configurations for CCN programming are located in the local displays at ***Configuration→CCN***. See Appendix A.

CCN Address (CCN.A)

This configuration is the CCN address the rooftop is assigned.

CCN Address (CCN.B)

This configuration is the CCN bus the rooftop is assigned.

CCN Baud Rate (BAUD)

This configuration is the CCN baud rate.

CCN Time/Date Broadcast (BROD→B.TIM)

If this configuration is set to ON, the control will periodically send the time and date out onto the CCN bus once a minute. If this device is on a CCN network then it will be important to make sure that only one device on the bus has this configuration set to ON. If more than one time broadcaster is present, problems with the time will occur.

NOTE: Only the time and date broadcaster can perform daylight savings time adjustments. Even if the rooftop is stand alone, the user may want to set this to ON to accomplish the daylight/savings function.

CCN OAT Broadcast (BROD→B.OAT)

If this configuration is set to ON, the control will periodically broadcast its outside-air temperature at a rate of once every 30 minutes.

Global Schedule Broadcast (BROD→B.GS)

If this configuration is set to ON and the schedule number (***SCH.N***) is between 65 and 99, then the control will broadcast the internal time schedule once every 2 minutes.

CCN Broadcast Acknowledger (BROD→B.ACK)

If this configuration is set to ON, then when any broadcasting is done on the bus, this device will respond to and acknowledge. Only one device per bus can be configured for this option.

Schedule Number (SCH.O→SCH.N)

This configuration determines what schedule the control may follow.

SCH.N = 0	**The control is always occupied.**
SCH.N = 1	**The control follows its internal time schedules. The user may enter any number between 1 and 64 but it will be overwritten to "1" by the control as it only has one internal schedule.**
SCH.N = 65–99	**The control is either set up to receive to a broadcasted time schedule set to this number or the control is set up to broadcast its internal time schedule (*B.GS*) to the network and this is the global schedule number it is broadcasting. If this is the case, then the control still follows its internal time schedules.**

Accept Global Holidays? (SCH.O→HOL.G)

If a device is broadcasting the time on the bus, it is possible to accept the time yet not accept the global holiday from the broadcast message.

Override Time Limit (SCH.O→OV.TL)

This configuration allows the user to decide how long an override occurs when it is initiated. The override may be configured from 1 to 4 hours. If the time is set to 0, the override function will become disabled.

Timed Override Hours (SCH.O→OV.EX)

This displays the current number of hours left in an override. It is possible to cancel an override in progress by writing "0" to this variable, thereby removing the override time left.

SPT Override Enabled? (SCH.O→OV.SP)

If a space sensor is present, then it is possible to override an unoccupied period by pushing the override button on the T55 or T56 sensor. This option allows the user to disable this function by setting this configuration to NO.

Demand Limit

Demand Limit Control may override the cooling algorithm to limit or reduce cooling capacity during run time. The term Demand Limit Control refers to the restriction of machine capacity to control the amount of power that a machine will use. This can save the owner money by limiting peaks in the power supply. Demand limit control is intended to interface with an external network system. This is through a CCN Loadshed POC Device or writing to network points.

To limit stages through network writes, the points ***Run Status →COOL→MAX.C*** and ***Run Status→HEAT→MAX.H*** are forced on the network through CCN points MAXCSTGS and MAXHSTGS respectively. Force these to the desired maximum stages of cooling/dehumidification and heating, respectively. When there is no force on these points, they automatically reset to allow all cooling/dehumidification and heating stages to be used. These points are reset at power–on/reset (POR).

When using the Loadshed POC to do Demand Limiting, the cool and heat stage limits under both Redline and Loadshed conditions can be set individually with configuration decisions. If the active stages is greater then the loadshed or redline configurations when a loadshed or redline command is given, the unit will remove stages.

Configuration→CCN→LDSH→S.GRP

This is the Loadshed Group Number and corresponds to the loadshed supervisory devices that resides elsewhere on the CCN network and broadcasts loadshed and redline commands to its associated equipment parts. This variable will default to zero which is an invalid group number. This allows the loadshed function to be disabled until configured.

Configuration→CCN→LDSH→R.MXC

This configuration tells the unit the maximum cooling stages allowed to be on during a redline condition.

Configuration→CCN→LDSH→S.MXC

This configuration tells the unit the maximum cooling stages allowed to be on during a loadshed condition.

Configuration→CCN→LDSH→R.MXH

This configuration tells the unit the maximum heating stages allowed to be on during a redline condition.

Configuration→CCN→LDSH→S.MXH

This configuration tells the unit the maximum heating stages allowed to be on during a loadshed condition.

The two Demand Limiting methods can be active simultaneously. The lowest cool and heat stage limits imposed by either method are applied, and these "effective stage limits" are shown in the points CSTGLIMT (***Run Status→COOL→LMT.C***) and HSTGLIMT (***Run Status→HEAT→LMT.H***), respectively. In normal running mode, these limits will prevent stages from being added, or stages to be removed, as applicable. In test mode, these limits are ignored, and the user may continue to operate all stages. The point MODEDMDL (***Run Status→MODE→D.LMT***) is used to show if any Demand Limiting is in effect that prevents the unit from operating either cooling or heating at full–capacity.

NOTE: MODEDMDL may reflect that staging is NOT limited even though Loadshed is active, or the network points are being forced, if the stage limits in effect are not less than the stages present in the unit.

If a more drastic mode of Demand Limiting is required, the network point HVACDOWN (***Run Status→MODE→HV.DN***) can be used to prohibit the unit from selecting any HVAC mode, thus preventing the operation of the supply fan, compressors, condenser fans, and heat stages. This point must also be forced, and is reset automatically when not forced, and at POR.

NOTE: HVACDOWN can be used as an immediate shutdown of the unit before limiting capacity (ex. Generator switching).

Linkage

*Comfort*Link™ controls do not require any configuration settings to establish linkage with a Linkage Coordinator. This is done automatically when the unit's bus and element address are configured in the Linkage Coordinator's LINKAGE configuration table. The linkage information that is supplied to the *Comfort*Link unit by the Linkage Coordinator is as follows:

- Reference zone temperature
- Reference zone occupied biased heating and cooling set points
- Reference zone unoccupied heating and cooling set points
- Composite occupancy mode

The unit will control the equipment based on this information and in return will provide the Linkage Coordinator with the following data:

- Operating mode – Cooling, Heating, Free Cooling, Fire Shutdown Evacuation, or Off
- Supply–air temperature
- Optimal Start Bias time (Based on worst case zone)

This synchronization of data optimizes the efficiency of the unit and the zones to operate at peak system performance at all times. This information can be seen in linkage maintenance tables of the Linkage Coordinator and the RTU; it is updated at approximately 1−minute intervals.

Cooling and heating operation is slightly modified during Linkage control. A PID loop is run to calculate required stages. This is necessary because in stand alone operation, the unit tries to anticipate the space. With Linkage, the unit must try to satisfy the demand as soon as possible. The PID configurations are in ***Configuration→PID***. These values have been field tested and the default values should NOT BE CHANGED.

For information on set up and configuration, see the Space Temperature Control−CCN Linkage text in the Controls Quick Start section of this book.

For additional information on the Linkage Coordinator or Zone Controllers, please refer to their appropriate manuals.

Alarm Handling

There are a variety of different alerts and alarms in the system. Alerts are indicated by TXXX (where XXX is the alert number) on the display and generally signify that the improperly functioning circuit can restart without human interaction. If an alarm occurs, indicated by AXXX (where XXX is the alarm number), the damaged circuit will generally not restart without an alarm reset via the Scrolling Marquee display or CCN.

The response of the control system to various alerts and alarms depends on the seriousness of the particular alert or alarm. In the mildest case, an alert does not affect the operation of the unit in any manner. An alert can also cause a "strike." A "striking" alert will cause the circuit to shut down for 15 minutes. This feature reduces the likelihood of false alarms causing a properly working system to be shut down incorrectly. If three strikes occur before the circuit has an opportunity to show that it can function properly, the circuit will strike out, causing the shutdown alarm for that particular circuit. Once activated, the shutdown alarm can only be cleared via an alarm reset.

However, circuits with strikes will be given an opportunity to reset their strike counter to zero. As discussed above, a strike typically causes the circuit to shut down. Fifteen minutes later, that circuit will once again be allowed to run. If the circuit is able to run for 1 minute, its replacement circuit will be allowed to shut down (if not required to run to satisfy requested stages). However, the "troubled" circuit must run continuously for a user defined time (***Configuration→COOL→RST.C***) with no detectable problems before the strike counter will be reset to zero. Default value is 5 minutes.

CCN Alarm Broadcast

Operators of CCN networks might not want to be notified of "striking" alerts for refrigerant circuits until the circuit has been shut down due to 3 strikes. Set the cooling configuration of Alert Each Strike (***Configuration→COOL→ALM.N*** on display, ALM_NOW on CCN) to YES to broadcast each circuit strike alert. Set Alert Each Strike to NO to broadcast only circuit shut down. Alert Each Strike configuration is ignored during Service Test and all alerts are broadcast.

Alarm Relay Output

The alarm relay output is a normally open 24 vac output between field connection terminal board terminals C and X. Selection of which alerts and alarms will result in closing of the alarm relay may be set in the Alarm Relay Configuration (***Configuration→ALM.O***). Setting a configuration to YES will result in the alarm output relay, ***ALRM***, status of ON and 24 vac between C and X when that particular condition is in an alarm state. Setting a configuration to NO will result in no action by the alarm output relay for that particular condition.

NOTE: An accessory filter switch can be used along with the alarm relay output function to indicate dirty filter service need.

See the Troubleshooting section for more information on viewing, diagnosing, and clearing alerts and alarms.

TROUBLESHOOTING

The Scrolling Marquee display shows the actual operating conditions of the unit while it is running. If there are alarms or there have been alarms, they will be displayed in either the current alarm list or the history alarm list. (See Table 14.) The Service Test mode allows proper operation of the compressors, fans, and other components to be checked while the unit is not operating. See Service Test.

Complete Unit Stoppage

There are several conditions that can cause the unit not to provide heating or cooling:

- If an alarm is active which causes the unit to shut down, diagnose the problem using the information provided in Alarms and Alerts section below.
- Cooling and heating loads are satisfied.
- Programmed occupancy schedule.
- General power failure.
- Tripped CB1, CB2, or CB3 (24-volt transformer circuit breakers).
- Blown fuse (FU1−4)
- Unit is turned off through the CCN network.
- If supply-air temperature is less than the Minimum SAT Lower Level (***SAT.L***) configuration value, unit cannot cool.
- If outdoor-air temperature is less than the Compressor Lockout Temperature (***CA.LO, CB.LO, CC.LO***) configuration value, unit cannot cool.
- If outdoor-air temperature is greater than the Heating Lockout Temperature (***HT.LO***) configuration value, unit cannot heat.

Restart Procedure

Before attempting to restart the machine, check the alarm list to determine the cause of the shut down. If the shutdown alarm for a particular control function has occurred, determine and correct the cause before allowing the unit to run under its own control again. When there is problem, the unit should be diagnosed in Service Test mode. The alarms must be reset before the control function can operate in either Normal mode or Service Test mode.

Alarms and Alerts

Viewing and Clearing Unit Alarms

Presence of active alarms will be indicated on the Scrolling Marquee display by the Alarm Status light turning on and by the number of active alarms being displayed in the automatic View of Run Status. Presence of active alarms may also be signaled on the Alarm Output terminals. Each alarm may also be broadcast on the CCN network. Active alarms and past alarm history can be reviewed and cleared via the local display or a CCN device. The following menu locations are used for the local display:

Alarms→R.CURR (Reset All Current Alarms)

Change to YES to reset all active alarms. Turning unit power off will also reset all current alarms.

Alarms→R.HIST (Reset Alarm History)

Change to YES to reset the alarm history. Turning unit power off will not reset the alarm history.

Alarms→CURR (Currently Active Alarms)

Use the ENTER key, then scroll through any alarm numbers using the up and down arrow keys. Alarms are displayed in numerical order.

Alarms→HIST (Alarm History)

Use the ENTER key, then scroll through any alarm numbers using the up and down arrow keys. Up to 20 alarms are displayed in order of occurrence, with time and date.

The description for an alarm can be viewed on the Scrolling Marquee display by pressing ESCAPE and ENTER keys simultaneously while displaying the alarm code number. Be sure to expand description for each code, because in some cases there are different possible descriptions and causes for the same code number.

Diagnostic Alarm Codes and Possible Causes

Alert Codes T051, T052, T055 and T059

There are 4 different texts for each alert code. There are two different alerts which have corresponding test mode alerts indicated with "Service Test" in the expanded text. Pressing enter and esc on the marquee or navigator to expand the T051, T052, T055, or T059 alert will show you one of the below alerts. Make sure the expanded text is read correctly before troubleshooting. Alert codes T051, T052, T055, and T059 are for compressors A1, A2, B1, and C1, respectively.

- Compressor Safety Trip

  These alerts occur when the Current Sensor (CS) does not detect compressor current during compressor operation. When this occurs, the control turns off the compressor and logs a strike for the respective circuit. These alerts reset automatically. The possible causes are: high−pressure switch (HPS) open (The HPS is wired in series with compressor relays on the MBB. If the high−pressure switch opens during compressor operation, the compressor stops, and the CS no longer detects current, causing the control to activate this alert), compressor internal protection is open, or a wiring error (a wiring error might not allow the compressor to start).

  To check out the alert:

  1. Turn on the compressor in question using Service Test mode. If the compressor does not start, then most likely the problem is one of the following: HPS open, open internal protection, incorrect safety wiring, or incorrect compressor wiring.
  2. If the compressor starts, verify that the indoor and outdoor fans are operating properly.
  3. If the CS is always detecting current, then verify that the compressor is on. If the compressor is on, check the contactor and the relay on the MBB. If the compressor is off and there is no current, verify CS wiring and replace if necessary.
  4. Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized after compressor starts.

- Compressor Current Detected After Turnoff

  These alerts occur when the Current Sensor (CS) detects current when the compressor should be off. When this occurs, the control turns off all of the compressors. Use the Scrolling Marquee to reset the alert. The possible causes are a welded contactor or frozen compressor relay on MBB.

  To check out alert:

  1. Place the unit in Service Test mode. All compressors should be Off.
  2. Verify that there is not 24vac at the contactor coil. If there is 24vac at the contactor, check relay on MBB and wiring.
  3. Check for welded contactor.
  4. Verify CS wiring.
  5. Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized after compressor starts.

Alert Codes T064, T065 and T080 – Circuit Saturated Condensing Temp Thermistor Failure

Alert codes T064, T065, and T080 are for circuits A, B and C, respectively. These alerts occur when the temperature is outside the range –40° to 240°F (–40° to 116°C). When this occurs, the control will use only the outdoor temperature to control the outdoor fans. If both the SCT and OAT fail, then circuit shutdown alarm will occur also. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code T066, T067, and T081 – Circuit Saturated Suction Temperature Thermistor Failure

Alert codes T066, T067, and T081 are for circuits A, B and C, respectively. These alerts occur when the unit's suction transducers are turned off internally. Cooling will not operate. This is usually due to a network force on a non exposed CCN point. Reload factory defaults or reinstall software on the MBB. Consult the network manager if alert continues.

Alert Code T073 – Outdoor Air Temperature Thermistor Failure

This alert occurs when the temperature is outside the range –40° to 240°F (–40° to 116°C). For all units, all ambient temperature lockout limits for cooling and heating are ignored. For all units, if both SCT and OAT fail, then circuit shutdown alarm will also occur. For economizer equipped units, the economizer will not operate to provide cooling. The economizer will still operate for ventilation. The control will use condenser temperatures for outdoor fan control. For units with CCH crankcase heat relay control, the crankcase heat relay will be turned on if any compressor is off. This alert resets automatically. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code T074 – Space Temperature Thermistor Failure

This alert occurs when the temperature is outside the range –40° to 240°F (–40° to 116°C). This alert will only occur if the unit control type is configured for Space Sensor (versus Thermostat). Cooling and heating will not operate. For economizer equipped units, the economizer will still operate for ventilation. This alert resets automatically. The cause of the alert is usually a faulty thermistor in the T−55, T−56, or T−58 device, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code T075 – Supply Air Temperature Thermistor Failure

This alert occurs when the temperature is outside the range –40° to 240°F (–40° to 116°C). Economizer cooling and adaptive compressor staging cannot occur while this alarm is active. This alert resets automatically. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code T076 – Return Air Thermistor Failure

This alert occurs when the temperature is outside the range –40° to 240°F (–40° to 116°C). This alert will only occur if the unit is configured for a return air sensor. Economizer differential dry bulb control will not be allowed during this alert. This alert resets automatically. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code T077 – Space Relative Humidity Sensor Failure

This alert occurs when the input is less than 3.5 mA and the sensor is configured as installed. If a humidistat is not installed, then dehumidification will not be functional. Check sensor and wiring. This alert clears automatically.

NOTE: An ECB must be installed to use the space relative humidity sensor.

Alert Code T080 – Circuit C Saturated Condensing Temp Thermistor Failure

See Alert T064

Alert Code T081 – Circuit Saturated Suction Temperature Thermistor Failure

See Alert T066

Alert Codes T092, T093, T101 – Circuit Suction Pressure Transducer Failure

Alert codes T092, T093, and T101 are for circuits A, B and C, respectively. These alerts occur when the board does not properly read the transducer voltage. A circuit cannot run when this alert is active. Use the Scrolling Marquee to reset the alarm. The cause of the alert is usually a faulty transducer, faulty 5−v power supply, or a loose connection.

Alert Codes T102, T103, and T104 – Compressor Current Sensor Failure

Alert codes T102, T103, and T104 are for compressors A1 and A2, B1 and C1, respectively. These alerts occur when the output of the current sensor (CS) is a constant high value. These alerts reset automatically. The cause of the alert is a wiring error or a loose connection. If the problem cannot be resolved and the CS board must be replaced, the CS board can be temporarily disabled while securing a replaced board. A CS board is disabled by setting the corresponding configuration to DISABLE (***Configuration→COOL→CIR.A→CS.A1, CS.B1 or CS.C1***).

Alert Codes T110, T111, and T140 – Circuit Loss of Charge

Alert codes T110, T111, and T140 are for circuits A, B and C, respectively. These alerts have "Service Test" text that will be displayed if the alert occurred during service test. These alerts occur when the compressor is OFF and the suction pressure is less than 5 psig and OAT is greater than –5°F for 1 continuous minute. Use the Scrolling Marquee to reset the alert. The cause of the alert is usually low refrigerant pressure or a faulty suction pressure. These alerts only occur when the compressor is OFF because the low refrigerant pressure alarms (alerts T133, T134 and T141) handle this situation when the compressor is operating.

Alert Codes T126, T127 and T142 – Circuit High Discharge Pressure

Alert codes T126, T127, and T142 are for circuits A, B and C, respectively. These alerts have "Service Test" text that will be displayed if the alert occurred during service test. These alerts occur when alerts T051, T055, or T059 are active while the appropriate condensing temperature is greater than 150°F. These alerts reset automatically. The cause of the alert is usually an overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high−pressure switch. See Alerts T051, T055 and T059 for diagnostic procedure.

Alert Codes T133, T134 and T141 – Circuit Low Refrigerant Pressure

Alert codes T133, T134 and T141 are for circuits A, B and C, respectively. These alerts have "Service Test" text that will be displayed if the alert occurred during service test. These alerts occur when the compressor is operating and the evaporating temperature (converted from the suction pressure) is less than configured low suction control levels, ***Configuration→COOL→SST→SST.1*** (Low Suction — Level 1) or ***SST.2*** (Low Suction — Level 2) or ***SST.3*** (Low Suction Level 3). The circuit SST value must be less than SST.1 (for 5 minutes), SST.2 (for 4 minutes), or SST.3 (for 3 minutes when using the economizer and 1.5 minutes when not using the economizer) for the alert to occur. When the outdoor temperature is less than 40°F, the above values are reduced 1°F for every 2°F the OAT is below 40°F. An alert will also occur if the circuit SST value is less than SST.3 –5°F for 20 seconds and the outdoor temperature is above 40°F. All the above timers will reset if the suction temperature rises above SST.O for 1 minute. These alerts cause a strike for the respective circuit. If the OAT is less than 10°F, the circuit will shut down without a strike. These alerts will activate when the coil becomes frosted. However, during the 15−minute reset period, the coils will thaw and strike should clear at restart if there is nothing else wrong with the circuit. The alert resets automatically. The cause of the alert is usually low refrigerant charge, dirty filters, evaporator fan operating backwards, loose or broken belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.

Alert Codes T140 – Circuit C Loss of Charge

See Alert T110.

Alert Codes T141 – Circuit C Low Refrigerant Pressure

See Alert T133.

Alert Codes T142 – Circuit High Discharge Pressure

See Alert T126.

Alert Codes T143, T144 – Circuit Failure to Pressurize

Alert codes T143, T144, and T145 are for circuits A, B, and C, respectively. These alerts have "Service Test" text that will be displayed if the alert occurred during service test. These alerts occur when the compressor turns on and the suction pressure does not drop at least 10 PSIG and stay there for the first 20 seconds AND the condensing temperature does not rise at least 5°F and stay there for the first 65 seconds (both conditions have to occur). These alerts cause a strike for the respective circuit. The alert resets automatically. The cause of the alert is usually compressor wiring causing reverse rotation or a faulty compressor.

Alarm Code T153 – Real Time Clock Hardware Failure

The alert occurs when the RTC clock chip on the MBB is not responding. Time and date functions will not operate, such as local occupancy schedules. The unit will default to 24/7 unoccupied mode. Recovery is automatic but MBB board replacement may be necessary. Cycling power to the control and reconfiguring the time and date should be tried before board replacement.

Alarm Code A154 – Serial EEPROM Hardware Failure

The unit will completely shut down. The serial EEPROM chip on the MBB which stores the unit's configuration is not responding. Recovery is automatic, but MBB board replacement may be necessary. Cycling the power to the control should be tried before board replacement.

Alarm Code T155 – Serial EEPROM Storage Failure Error

Configuration data in the serial EEPROM chip can not be verified. The unit will run to last know good values or defaults, and therefore operating errors may occur. Recovery is automatic but MBB board replacement may be necessary. Cycling power to the control and reconfiguring the control points should be tried before board replacement.

Alarm Code A156 – Critical Serial EEPROM Storage Fail Error

The unit will completely shut down. Critical configuration data in the serial EEPROM chip can not be verified. Recovery is automatic but MBB board replacement may be necessary. Cycling power to the control and reconfiguring the critical control points should be tried before board replacement. Check the configurations for the following critical points:

Configuration→COOL→N.CIR (Number of Circuits)

Configuration→COOL→N.A(Compressors on Circuit A)

Configuration→COOL→OFC→OFC.3 (OFC.3 Enable, CCH Disable)

Configuration→HMZR→REHT (Humidi–MiZer™ Equipped)

Configuration→HMZR→RH.FN (Reheat Fan Control)

Alarm Code A157 – A/D Hardware Failure

The unit will completely shut down. The analog to digital conversion chip on the MBB has failed. Recovery is automatic but MBB board replacement may be necessary. Cycling power to the control should be tried before board replacement.

Alarm Codes A163, A164, and A165 – Circuit Down due to Failure

Alarm codes A163, A164, and A165 are for circuits A, B, and C, respectively. These alarms have "Service Test" text that will be displayed if the alarm occurred during service test. These alarms occur when a circuit has 3 strikes. Use the Scrolling Marquee display to reset the alarm. Investigate the alarm that caused the strikes to occur.

Alert Code T173 – Loss of Communication with the Energy Management Module

This alert occurs when the MBB cannot communicate with the EMM. These units do not currently support any operation with the EMM. This alert is caused by an internal force to look for the EMM board. When this happens, reload software on the MBB and do not restore configurations, the factory configurations must be used at first. Replace the MBB if alert continues.

Alert Code T179 – Loss of Communication with the Economizer Control Board

This alert occurs when the MBB cannot communicate with the ECB. Economizer operation will be disabled. This is usually caused by a wiring problem. If a relative humidity sensor is installed and configured but there is not an ECB installed on the unit, this alert will be generated (the ECB is required for RH sensor operation). Investigate using the Low Voltage Schematic, check that the ECB address is correct, and verify the resistance between pins on the LEN connections.

Alert Code T180 – Loss of Communication with the Economizer Actuator

This alert occurs when the ECB cannot communicate with the Belimo Actuator. If the analog signal is connected properly, the economizer can still be controlled through it. This is usually caused by a wiring problem, actuator failure, or the wrong actuator. Investigate using the Low Voltage Schematic. Make sure the actuator is a MFT communication actuator and verify the feedback signal from the actuator is correct.

Alert Code T181 – Loss of communication with Outside Air Unit

This alert occurs when the Outdoor Air Unit Type (***Configuration → OAU → OA.TY***) is not set to 0 and the OAU Operating Mode (***Run Status → OAU → OA.OP***) has not been communicated in the past 3 minutes. The control will reset all OAU data. This alert will automatically reset when communication is established again. This alert is usually caused by a wiring problem or a problem with the OAU communication.

Alarm Code A200 – Linkage Timeout – Comm Failure

This alarm occurs when the MBB fails to communicate with a Linkage device. This only occurs when the MBB has previously communicated with a Linkage device since last power cycle. If a back up sensor was not installed the T074 alert will occur shortly after this one. Reset power to the unit and verify Linkage is communicating.

Alarm Code A404 – Fire Shutdown

This alarm occurs when the shutdown input is either open or closed depending upon its configuration. This alarm is usually caused by an auxiliary device that is trying to shut down the unit, e.g., smoke detector. The configuration for this switch input can be found at variable ***Configuration→UNIT→FS.SW***. Verify that the configuration is set correct, verify the wiring and auxiliary device. This alarm resets automatically.

Alert Code T408 – Dirty Air Filter

This alert occurs when the Filter Status switch senses a plugged filter for 120 continuous seconds after the indoor fan has been running for 10 seconds. Because the Dirty Air Filter switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at variable ***Configuration→UNIT→FL.SW***. Verify that the configuration is set correct, verify the wiring and filter status switch. The hose should be connected to the low side of the switch. This alert resets automatically.

Alert Code T409

There are 2 different texts for this alert code. Pressing enter and esc on the marquee or navigator to expand the T409 alert will show you one of the below alerts. Make sure the expanded text is read correctly before troubleshooting.

- Fan Status Switch On, Fan Contactor Off
  This alarm occurs when the fan status switch has sensed that the indoor fan has been on for 10 seconds and the indoor fan feedback has determined that the indoor fan should be off. Because the Fan Status switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at ***Configuration→UNIT→FN.SW***. Verify that the configuration is set correctly. Verify the wiring and fan status switch. The hose should be connected to the high side of the switch. If the IDF is configured to shut down the unit when this alarm occurs (***Configuration→UNIT→IDF.F = YES***), then this alarm can only be reset manually and the unit is shut down. If the IDF is not configured to shut the unit down when this alarm occurs (IDF.F = NO), then this alarm resets automatically and no specific control action is taken.

Table 12 – *Comfort*Link™ Alarm Codes

ALARM OR ALERT NUMBER	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T051	Compressor A1 Safety Trip	Add Strike for Circuit A	Automatic	High−pressure switch open. Compressor internal protection open. Wiring error
	Service Test − Compressor A1 Safety Trip			
	Compressor A1 Current Detected After Turnoff	Turn off all compressors	Automatic	Welded contactor
	Service Test − Compressor A1 Current Detected After Turnoff			
T052	Compressor A2 Safety Trip	Add Strike for Circuit A	Automatic	High−pressure switch open. Compressor internal protection open. Wiring error
	Service Test − Compressor A2 Safety Trip			
	Compressor A2 Current Detect After Turnoff	Turn off all compressors	Automatic	Welded contactor
	Service Test − Compressor A2 Current Detected After Turnoff			
T055	Compressor B1 Safety Trip	Add Strike for Circuit B	Automatic	High−pressure switch open. Compressor internal protection open. Wiring error
	Service Test − Compressor B1 Safety Trip			
	Compressor B1 Current Detect After Turnoff	Turn off all compressors	Automatic	Welded contactor
	Service Test − Compressor B1 Current Detected After Turnoff			
T059	Compressor C1 Safety Trip	Add Strike for Circuit C	Automatic	High−pressure switch open. Compressor internal protection open. Wiring error
	Service Test − Compressor C1 Safety Trip			
	Compressor C1 Current Detect After Turnoff	Turn off all compressors	Automatic	Welded contactor
	Service Test − Compressor C1 Current Detected After Turnoff			
T064	Circuit A Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T065	Circuit B Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T066	Circuit A Saturated Suction Temperature Thermistor Failure	No Circuit A Cooling	Automatic	Circuit A Suction transducer internally forced inactive
T067	Circuit B Saturated Suction Temperature Thermistor Failure	No Circuit B Cooling	Automatic	Circuit B Suction transducer internally forced inactive
T073	Outdoor Air Temperature Thermistor Failure	No cooling with economizer	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T074	Space Temperature Thermistor Failure	If U.CTL = 3, then no heating or cooling	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T075	Supply Air Temperature Thermistor Failure	No cooling with economizer and No adaptive compressor staging	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T076	Return Air Thermistor Failure	If RAT.S = Yes, then no differential Dry Bulb control	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T077	Space Relative Humidity Sensor Failure	If RH.S = Yes, then no indoor humidity control	Automatic	Faulty, shorted, or open sensor caused by wiring error or loose connection.
T080	Circuit C Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T081	Circuit C Saturated Suction Temperature Thermistor Failure	No Circuit C Cooling	Automatic	Circuit C Suction transducer internally forced inactive
T092	Circuit A Suction Pressure Transducer Failure	Lockout Circuit A	Manual	Faulty transducer, faulty 5−V power supply, or loose connection
T093	Circuit B Suction Pressure Transducer Failure	Lockout Circuit B	Manual	Faulty transducer, faulty 5−V power supply, or loose connection
T101	Circuit C Suction Pressure Transducer Failure	Lockout Circuit C	Manual	Faulty transducer, faulty 5−V power supply, or loose connection
T102	Compressor A1 Current Sensor Failure	If CS.A1 = Enable, then no T051 current alarm	Automatic	Faulty current sensor caused by wiring error or loose connection
	Compressor A2 Current Sensor Failure	If CS.A2 = Enable, then no T052 current alarm	Automatic	Faulty current sensor caused by wiring error or loose connection
T103	Compressor B1 Current Sensor Failure	If CS.B1 = Enable, then no T055 current alarm	Automatic	Faulty current sensor caused by wiring error or loose connection
T104	Compressor C1 Current Sensor Failure	If CS.C1 = Enable, then no T059 current alarm	Automatic	Faulty current sensor caused by wiring error or loose connection
T110	Circuit A Loss of Charge	Lockout Circuit A	Manual	Low refrigerant or faulty suction pressure transducer
	Service Test − Circuit A Loss of Charge			
T111	Circuit B Loss of Charge	Lockout Circuit B	Manual	Low refrigerant or faulty suction pressure transducer
	Service Test − Circuit B Loss of Charge			
T126	Circuit A High Discharge Pressure	Shutdown Circuit A	Automatic	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high−pressure switch.
	Service Test − Circuit A High Discharge Pressure			
T127	Circuit B High Discharge Pressure	Shutdown Circuit B	Automatic	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high−pressure switch.
	Service Test − Circuit B High Discharge Pressure			
T133	Circuit A Low Refrigerant Pressure	Add Strike for Circuit A	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
	Service Test − Circuit A Low Refrigerant Pressure			
T134	Circuit B Low Refrigerant Pressure	Add Strike for Circuit B	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
	Service Test − Circuit B Low Refrigerant Pressure			
T140	Circuit C Loss of Charge	Lockout Circuit C	Manual	Low refrigerant or faulty suction pressure transducer
	Service Test − Circuit C Loss of Charge			
T141	Circuit C Low Refrigerant Pressure	Add Strike for Circuit C	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
	Service Test − Circuit C Low Refrigerant Pressure			
T142	Circuit C High Discharge Pressure	Shutdown Circuit C	Automatic	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high−pressure switch.
	Service Test − Circuit C High Discharge Pressure			
T143	Circuit A Failure To Pressurize	Add Strike for Circuit A	Automatic	Wiring causing reverse rotation or faulty compressor
	Service Test − Circuit A Failure to Pressurize			
T144	Circuit B Failure To Pressurize	Add Strike for Circuit B	Automatic	Wiring causing reverse rotation or faulty compressor
	Service Test − Circuit B Failure to Pressurize			
T145	Circuit C Failure To Pressurize	Add Strike for Circuit C	Automatic	Wiring causing reverse rotation or faulty compressor
	Service Test − Circuit C Failure to Pressurize			
T153	Real Timeclock Hardware Failure	No time and date schedule operation	Automatic	No time/date configured, software failure, or MBB failure

* See Legend on next page

Table 12 — *Comfort*Link™ Alarm Codes (cont)

ALARM OR ALERT NUMBER	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
A154	Serial EEPROM Hardware Failure	Unit Shutdown	Automatic	Software failure or MBB failure
T155	Serial EEPROM Storage Failure Error	Unit operation errors	Automatic	Software failure or MBB failure
A156	Critical Serial EEPROM Storage Fail Error	Unit Shutdown	Automatic	Software failure or MBB failure
A157	A/D Hardware Failure	Unit Shutdown	Automatic	Software failure or MBB failure
A163	Circuit A Down Due to Failure	Lockout Circuit A	Manual	Circuit has 3 strikes or has been locked out by another alarm
	Service Test — Circuit A Down Due to Failure			
A164	Circuit B Down Due to Failure	Lockout Circuit B	Manual	Circuit has 3 strikes or has been locked out by another alarm
	Service Test — Circuit B Down Due to Failure			
A165	Circuit C Down Due to Failure	Lockout Circuit C	Manual	Circuit has 3 strikes or has been locked out by another alarm
	Service Test — Circuit C Down Due to Failure			
T173	Loss of communication with the Energy Management Module	No action	Automatic	MBB Software failure, reload software or replace board
T179	Loss of communication with the Economizer Control Board	No economizer operation	Automatic	Communication wiring problem with ECB or faulty MBB or ECB
T180	Loss of communication with the Economizer Actuator	No economizer operation	Automatic	Communication wiring problem with actuator.
T181	Loss of communication with Outside Air Unit	Reset OAU data	Automatic	Wiring Problem or OAU communication failure
A200	Linkage Timeout Error — Comm Failure	No Linkage Operation fall back to local SPT	Automatic	Received a table write from Linkage before, now not receiving any linkage commands
A404	Fire Shutdown	Unit Shutdown	Automatic	Smoke detected by smoke detector
T408	Dirty Air Filter	Alert Generated	Automatic	Dirty Filter
T409	Fan Status Switch ON, fan commanded off	If IDF.F = Yes, then Unit Shutdown	If IDF.F = YES, then Manual, otherwise automatic	Bad Fan Status Switch. Configuration incorrect.
	Fan Status Switch OFF, fan commanded on	If IDF.F = Yes, then Unit Shutdown	If IDF.F = YES, then Manual, otherwise automatic	Tripped Circuit Breaker. Broken belt. Bad indoor fan motor. Configuration incorrect. Bad fan status switch.
T410	R—W1 Jumper Not Installed in Space Temp Mode	Unable to run heat	Automatic	Missing jumper wire
	R—W1 Jumper Must Be Installed to Run Heat In Service Test	Unable to Test Heat Outputs	Automatic	Missing jumper wire
T411	Thermostat Y2 Input Activated without Y1 Activated	Run unit as if Y2 and Y1 are On	Automatic	Bad Thermostat or Thermostat Wiring
T412	Thermostat W2 Input Activated without W1 Activated	Run unit as if W2 and W1 are On	Automatic	Bad Thermostat or Thermostat Wiring
T413	Thermostat Y and W Inputs Activated Simultaneously	Run unit in mode activated first	Automatic	Bad Thermostat or Thermostat Wiring
T414	Economizer Damper Actuator Out of Calibration	Alert Generated	Automatic	Calibrate economizer (E.CAL). If problem still exist then determine what is limiting economizer rotation.
	Economizer Damper Actuator Torque Above Load Limit	Alert Generated	Automatic	Actuator load too high. Check damper load.
	Economizer Damper Actuator Hunting Excessively	Alert Generated	Automatic	Damper position changing too quickly.
	Economizer Damper Stuck or Jammed	Alert Generated	Automatic	No economizer motion. Check damper blades, gears, and actuator.
	Economizer Damper Actuator Mechanical Failure	Alert Generated	Automatic	Check actuator and replace if necessary.
	Economizer Damper Actuator Direction Switch Wrong	Alert Generated	Automatic	Actuator direction control switch (CCW, CW) wrong.
T415	IAQ Input Out of Range	No IAQ Operations	Automatic	Bad sensor, bad wiring, or sensor configured incorrectly.
T416	OAQ Input Out of Range	No OAQ Operations	Automatic	Bad sensor, bad wiring, or sensor configured incorrectly.
T418	OAU Motor Failure	Alert generated	Automatic	Check OAU motors for failure
	OAU Dirty Filter	Alert generated	Automatic	Check/change OAU filters
	OAU Low CFM	Alert generated	Automatic	Check OAU air flow
	OAU General Alarm	Alert generated	Automatic	Check OAU

LEGEND

ECB — Economizer Control Board
IGC — Integrated Gas Controller
MBB — Main Base Board
OAT — Outdoor—Air Thermistor

- Fan Status Switch Off, Fan Contactor On

  This alert occurs when the fan status switch has sensed that the indoor fan has been off for 10 seconds and the indoor fan feedback has determined that the indoor fan should be on. Because the Fan Status switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at ***Configuration→UNIT→FN.SW***. Verify that the configuration is set correctly. Verify the wiring and fan status switch. The hose should be connected to the high side of the switch. If the IDF is configured to shut down the unit down when this alert occurs (***Configuration→UNIT→IDF.F = YES***), then this alarm can only be reset manually and the unit is shut down. If the IDF is not configured to shut the unit down when this alert occurs (IDF.F = NO), then this alert resets automatically and no specific control action is taken.

Alert Code T410

- R–W1 Jumper Not Installed in Space Temp Mode

  This alert occurs when the control mode is Space Temperature mode via Auto Select or Space Temp Select, yet there is no power to W1. Verify that space temperature mode is the desired mode or add jumper between R and W1. This alert resets automatically.
- R–W1 Jumper Must be Installed to Run Heat in Service Test

  This alert occurs when a request for a heat output has occurred yet the W1 input is not high. A jumper must be installed between R and W1 when trying to test heat in Service Test. The alert will clear when Service Test is exited or if another Service Test mode is selected. Remove jumper when done using Service Test if the unit is operating with a thermostat. The jumper should only be left in place if the unit is operating with a space temperature probe.

Alert Code T411 – Thermostat Y2 Input Activated without Y1 Activated

This alert occurs in Thermostat mode when Y2 is energized and Y1 is not. Verify thermostat and thermostat wiring. When Y2 turns On, the software will behave as if Y1 and Y2 are both On. When Y2 turns Off, the software will behave as if Y1 and Y2 are both Off. This alert resets automatically when Y1 is turned On.

Alert Code T412 – Thermostat W2 Input Activated without W1 Activated

This alert occurs in Thermostat mode when W2 is energized and W1 is not. Verify thermostat and thermostat wiring. When W2 turns On, the software will behave as if W1 and W2 are both On. When W2 turns Off, the software will behave as if W1 and W2 are both Off. This alert resets automatically when W1 is turned On.

Alert Code T413 – Thermostat Y and W Inputs Activated Simultaneously

This alert occurs in Thermostat mode when Y1 or Y2 is energized simultaneously with W1 or W2. Verify thermostat and thermostat wiring. The software will enter either the cooling or heating mode depending upon which input turned on first. This alert resets automatically when Y1 and Y2 are not on simultaneously with W1 and W2.

Alert Code T414

There are 6 different alerts under this one alert code. Pressing enter and esc on the marquee or navigator to expand the T414 alert will show you one of the below alerts. All these alerts are generated by the Belimo actuator and reported to the ECB. These alerts can only occur if the ECB is controlling the actuator digitally through MFT.

- Economizer Damper Actuator Out of Calibration

  This alert occurs when the economizer actuator reports a control angle (***Operating Modes→ECON→C.ANG***) less than the minimum control angle (***Configuration→ECON→M.ANG***). Initiate economizer calibration (***Service Test→INDP→E.CAL***) using the Service Test menu. The economizer calibration procedure will try to find new maximum open and closed positions. If the alert does not clear automatically after the calibration procedure is complete, investigate what is limiting economizer rotation. After that step, run another calibration, but first power off unit (spring return the damper), loosen the actuator clamp, and while pushing the damper closed, tighten the clamp. This alert resets automatically.
- Economizer Damper Actuator Torque Above Load Limit

  This alert occurs when the actuator load is too high. Investigate to determine what is increasing damper load, and verify that the actuator is the correct size for the unit. This alert resets automatically.
- Economizer Damper Actuator Hunting Excessively

  This alert occurs when the commanded damper position is changing too rapidly. The stop jog ratio must be less than 21% to clear this alert. Leave the actuator powered with no signal for a few hours to allow the ratio to decrease (may have to wait longer than a few hours). If the alert continues, determine if the ECB or actuator is bad. This alert resets automatically.
- Economizer Damper Stuck or Jammed

  This alarm occurs when the actuator is no longer moving and the actual position is greater than or less than 3% of the commanded position for 20 seconds. Investigate what is stopping the rotation of the actuator and fix. This alert resets automatically.
- Economizer Damper Actuator Mechanical Failure

  This alert occurs when the actuator senses a catastrophic failure. Investigate actuator and replace if necessary. This alert resets automatically.
- Economizer Damper Actuator Direction Switch Wrong Position

  This alert occurs when the economizer damper direction switch is in the wrong position. The direction switch should be in the clockwise position and the actuator should be mounted so that the CW face of the actuator is accessible. Correct if necessary. This alert clears automatically.

Alert Code T415 – IAQ Input Out of Range

This alert occurs when the IAQ input (on ECB) is less than 3.5 mA and the sensor is configured as installed. IAQ operation will be disabled. Check sensor and wiring. This alert clears automatically.

Alert Code T416 – OAQ Input Out of Range

This alert occurs when the OAQ input (on ECB) is less than 3.5 mA and the sensor is configured as installed. OAQ operation will be disabled. Check sensor and wiring. This alert clears automatically.

Alert Code T418

There are 4 different alerts under this one alert code. Pressing enter and esc on the marquee or navigator to expand the T418 alert will show you one of the below alerts. All these alerts are generated by the OAU device and reported to the MBB. These alerts can only occur if the Outdoor Air Unit Type (***Configuration*** → ***OAU*** → ***OA.TY***) is not set to 0. Control action is only taken on the OAU side and these alerts will reset automatically when the OAU clears them. Refer to the EnergyXv2 Supplement Installation Instructions for more information on these alarms.

OAU Motor Failure

This alert occurs when the OAU Motor Failure Alarm (***Operating Modes*** → ***OAU*** → ***ALM.1***) is on. This is usually due to motor status reporting a failure on the OAU.

OAU Dirty Filter

This alert occurs when the OAU Dirty Filter Alarm (***Operating Modes*** → ***OAU*** → ***ALM.2***) is on. This is usually due to filter status reporting a dirty filter on the OAU.

OAU Low CFM

This alert occurs when the OAU Low CFM Alarm (***Operating Modes*** → ***OAU*** → ***ALM.3***) is on. This is usually due to OAU not capable of achieving proper CFM.

OAU General Alarm

This alert occurs when the OAU Alarm (***Operating Modes*** → ***OAU*** → ***ALM.4***) is on. Refer to the specific OAU documentation for details.

Control Module Communication

Red LED

Proper operation of the MBB and ECB control boards can be visually checked by looking at the red status LEDs. When operating correctly, the red status LEDs should blink in unison at a rate of once every 2 seconds. If the red LED on the ECB is not blinking, check the DIP switch positions on the board. If the red LEDs are not blinking in unison, verify that correct power is being supplied to all modules. A blinking red LED at the rate of once per second means that software is not loaded on the board. Also, be sure that the board is supplied with the current software. If necessary, reload current software. A board LED that is lit continuously should be replaced.

Green LED

The MBB and ECB each have one green LED. The Local Equipment Network (LEN) LED should always be blinking whenever power is on. If LEN LED is not blinking, check LEN connections for potential communication errors (MBB J3, J4, and J5). Communication between modules is accomplished by a 3-wire sensor bus. These 3 wires run in parallel from module to module. The J4 connector on the MBB also provides both power and communication directly to the Scrolling Marquee display. The J5 connector on the MBB provides a LEN interface at the field connection terminal (TB).

Yellow LED

The MBB has one yellow LED which is used to indicate CCN communication activity. The Carrier Comfort Network® (CCN) LED will blink during times of network communication.

Communication Failures

If the Scrolling Marquee or Navigator display Communication Failure or the green or yellow LED's do not flash on the boards then the problem could be the communication chip on one of the control boards (MBB or ECB). Disconnect all the LEN and CCN plugs from the board and use an ohm meter to measure the resistance on the communication pins of the boards to determine if the board is bad. If the reading is less than half the value indicated in Table 13, then the board needs to be replaced.

NOTE: The resistive values should be read when the board is powered off and the unit is locked out.

Table 13 – LEN and CCN Communication Resistances

Device	Board Serial Number	(LEN) Resistance between Pins/Connector			(CCN) Resistance between Pins/Connector		
		Pins 1 to 3	Pins 1 to 2	Pins 2 to 3	Pins 5 to 7	Pins 5 to 6	Pins 6 to 7
MBB	Prior to 4702N	15K Ω J3, J4, & J5	7.5K Ω J3, J4, & J5	7.5K Ω J3, J4, & J5	15K Ω J5	7.5K Ω J5	7.5K Ω J5
	Starting 4702N	18.9K Ω J3, J4, & J5	9.9K Ω J3, J4, & J5	9.9K Ω J3, J4, & J5	18.9K Ω J5	9.9K Ω J5	9.9K Ω J5
ECB	Prior to 0803N	5.9K Ω J2	5.2K Ω J2	5K Ω J2	–	–	–
	Starting 0803N	18.9K Ω J2	9.9K Ω J2	9.9K Ω J2	–	–	–

Cooling Troubleshooting

Use the Scrolling Marquee display or a CCN device to view the cooling status display and the cooling diagnostic display (see Appendix A) for information on the cooling operation. Check the current alarms and alarm history for any cooling alarm codes and correct any causes. (See Table 12.) Verify any unique control configurations per installed site requirements or accessories.

If alarms conditions are corrected and cleared, operation of the compressors and fans may be verified by using the Service Test mode. (See Table 4.) See Table 14 for general cooling service analysis.

Table 14 – Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and Fan Will Not Start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped. Check CB1, CB2, and CB3.	Replace fuse or reset circuit breaker.
	Disconnect off.	Power disconnect.
	Compressor time guard to prevent short cycling.	Check using *Comfort*Link™ Scrolling Marquee.
	Thermostat or occupancy schedule set point not calling for Cooling.	Check using *Comfort*Link Scrolling Marquee.
	Outdoor temperature too low.	Check Compressor Lockout Temperature using *Comfort*Link Scrolling Marquee.
	Active alarm.	Check active alarms using *Comfort*Link Scrolling Marquee.
Compressor Cycles (other than normally satisfying thermostat).	Insufficient line voltage.	Determine cause and correct.
	Active alarm.	Check active alarms using *Comfort*Link *S*crolling Marquee.
Compressor Operates Continuously.	Unit undersized for load.	Decrease load or increase size of unit.
	Thermostat or occupancy schedule set point too low.	Reset thermostat or schedule set point.
	Dirty air filters.	Replace filters.
	Low refrigerant charge.	Check pressure, locate leak, repair, evacuate, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive Condenser Pressures.	Loose condenser thermistors.	Tighten thermistors.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharge.	Recover excess refrigerant.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV (and filter drier) if stuck open or closed.
	Condenser air restricted or air short cycling.	Determine cause and correct.
	Restriction in liquid tube.	Remove restriction.
Condenser Fans Not Operating.	No Power to contactors.	Fuse blown or plug at motor loose.
Excessive Suction Pressure.	High heat load.	Check for sources and eliminate
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV (and filter drier) if stuck open or closed.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction Pressure Too Low.	Dirty air filters.	Replace air filters.
	Low refrigerant charge.	Check pressure, locate leak, repair, evacuate, and recharge.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV (and filter drier) if stuck open or closed.
	Insufficient evaporator airflow.	Check belt tension. Check for other restrictions.
	Temperature too low in conditioned area (low return-air temperature).	Reset thermostat or occupancy schedule.

LEGEND

CB – Circuit Breaker
TXV – Thermostatic Expansion Valve

Humidi–MiZer™ Troubleshooting

Use the unit Scrolling Marquee display or a CCN device to view the cooling status display and the cooling diagnostic display (see Appendix A) for information on the cooling operation and the related Humidi-MiZer™ operation. Check the current alarms and alarm history for any cooling alarm codes and correct any causes. (See Table 12.) Verify any unique control configurations per installed site requirements or accessories.

If alarm conditions are corrected and cleared, operation of the compressors, fans, and Humidi-MiZer valves may be verified by using the Service Test mode. (See Table 4.) In addition to general cooling service analysis (See Table 14), see Table 15 for general Humidi-MiZer service analysis.

NOTE: Wiring, operation, and charge are different on a Humidi-MiZer unit compared to a standard unit.

Table 15 – Humidi-MiZer Service Analysis

PROBLEM	CAUSE	REMEDY
Subcooling Reheat Mode Will Not Activate.	General cooling mode problem.	See Cooling Service Analysis (Table 14).
	No dehumidification demand.	See No Dehumidification Demand, below.
	CRC relay operation.	See CRC Relay Operation, below.
	Circuit RH1 valve is not open.	See RH1 Valve Operation, below.
	Circuit CV valve is not closed.	See CV Valve Operation, below.
Hot Gas Reheat Mode Will Not Activate.	General cooling mode problem.	See Cooling Service Analysis (Table 14).
	No dehumidification demand.	See No Dehumidification Demand, below.
	CRC relay operation.	See CRC Relay Operation, below.
	Circuit RH1 valve is not open.	See RH1 Valve Operation, below.
	Circuit CV valve is not closed.	See CV Valve Operation, below.
	Circuit RH2 valve is not open.	See RH2 Valve Operation, below.
	Outdoor temperature too low.	Check Reheat2 Circuit Limit Temperatures (Configuration→HMZR→RA.LO and RB.LO) using *Comfort*Link™ Scrolling Marquee.
No Dehumidification Demand.	Relative humidity setpoint is too low — Humidistat	Check/reduce setting on accessory humidistat.
	Relative humidity setpoint is too low — RH sensor.	Check Space RH Setpoints (Setpoints→RH.SP and RH.UN) and occupancy using *Comfort*Link Scrolling Marquee.
	Software configuration error for accessory humidistat.	Check Space Humidity Switch (Configuration→ UNIT→RH.SW) using *Comfort*Link Scrolling Marquee.
	Software configuration error for accessory humidity sensor.	Check RH Sensor on OAQ Input (Configuration→ UNIT→RH.S) using *Comfort*Link Scrolling Marquee.
	No humidity signal.	Check wiring. Check humidistat or humidity sensor.
CRC Relay Operation.	No 24V signal to input terminals.	Check using Cool→Reheat1 Valve Test (Service Test→HMZR→CRC) using *Comfort*Link Scrolling Marquee.
		Check MBB relay output.
		Check wiring.
		Check transformer and circuit breaker.
	No power to output terminals.	Check wiring.
	Relay outputs do not change state.	Replace faulty relay.
CV or RH1 Valve Operation. (NOTE: Normally Open When De-energized)	No 24V signal to input terminals.	Check using Cool→Reheat1 Valve Test (Service Test→HMZR→CRC) using *Comfort*Link Scrolling Marquee.
		Check CRC Relay Operation.
		Check Wiring.
		Check transformer and circuit beaker or fuses.
	Solenoid coil burnout.	Check continuous over-voltage is less than 10%.
		Check under-voltage is less than 15%.
		Check for missing coil assembly parts.
		Check for damaged valve enclosing tube.
	Stuck valve.	Replace valve. Replace filter drier.
RH2 Valve Operation. (NOTE: Normally Closed When De-energized)	No 24V signal to input terminals.	Check using Cool→Reheat1 Valve Test (Service Test→HMZR→RHV.A or RHV.B) using *Comfort*Link Scrolling Marquee.
		Check MBB relay output.
		Check wiring.
		Check transformer and circuit breaker or fuses.
	Solenoid coil burnout.	Check continuous over-voltage is less than 10%.
		Check under-voltage is less than 15%.
		Check for missing coil assembly parts.
		Check for damaged valve enclosing tube.
	Stuck valve.	Replace valve. Replace filter drier.
Low Latent Capacity in Subcooling or Hot Gas Reheat Modes.	CV valve open or leaking.	See CV Valve Operation, above.
Low Sensible Capacity in Normal Cool or Subcooling Reheat Modes.	RH2 valve open or leaking.	See RH2 Valve Operation, above.
Low Suction Pressure and High Superheat During Normal Cool Mode.	General cooling mode problem.	See Cooling Service Analysis (Table 14).
	RH2 valve open or leaking.	See RH2 Valve Operation, above.
Low Suction Pressure and High Discharge Pressure.	General cooling mode problem.	See Cooling Service Analysis (Table 14).
	Both RH1 and CV valves closed.	See RH1 and CV Valve Operation, above.
RH2 Valve Cycling On/Off.	Hot Gas Reheat mode low suction pressure limit.	Normal Operation During Mixed Circuit Subcooling and Hot Gas Reheat Modes at Lower Outdoor Temperatures.
Circuit B or C Will Not Operate With Circuit A Off.	Normal operation. Motormaster outdoor fan control requires operation of circuit A.	None

LEGEND
CRC — Cooling/Reheat Control
CV — Cooling Valve
RH — Relative Humidity

Economizer Troubleshooting

Use the unit Scrolling Marquee display or a CCN device to view the economizer status display and the economizer diagnostic display (see Appendix A) for information on the economizer operation. Check the current alarms and alarm history for any economizer alarm codes and correct any causes. (See Table 12.) Verify any unique control configurations per installed site requirements or accessories. If alarms conditions are corrected and cleared, operation of the economizer may be verified by using the Service Test mode (see Service Test section and Table 4). The following steps specify how to test the economizer using the Scrolling Marquee display. See Table 16 for general economizer service analysis.

1. Enter the ***Service Test*** main menu on the display.
2. Enter ***TEST*** and turn ON test mode. A password may be needed in order to turn ON the Service Test. The default password is 1111.
3. Return to the main level of ***Service Test***.
4. Enter the ***INDP*** submenu and enter an initial value for ***ECON***. This will drive the economizer damper to the specified position. Continue to adjust the ***ECON*** value to make sure the economizer opens and closes.
5. Because of a mechanical problem with the economizer, the actuator might acquire a new degree of rotation which is less than M.ANG. If this occurs, a "T414 Economizer Damper Actuator Out of Calibration" alert will be generated. This alert can only occur if the economizer is using digital communications (***Configuration →ECON→E.CTL* = 1 or 2**). The economizer calibration procedure (***Service Test→IND.P→E.CAL***) will reconfigure the actuator to the new fully closed and fully open positions. To implement the calibration procedure, change ***E.CAL*** from OFF to ON. ***E.CAL*** will remain ON as long as the calibration procedure is being implemented (as long as 5 minutes). During the calibration procedure the actuator will close fully and then open fully. After the calibration is complete, the degree of rotation should be greater than M.ANG, causing the T414 alert to clear. If the T414 alert does not clear, check the economizer damper for other mechanical problems.
6. Return to ***Service Test→TEST*** and turn OFF test mode. This will cause the unit to return to normal operation.

Table 16 – Economizer Service Analysis

PROBLEM	POSSIBLE CAUSE	REMEDY
Damper Does Not Move.	Indoor Fan is off.	Check for proper thermostat connection.
		Unit is not configured for continuous fan operation and the thermostat is not calling for heating or cooling.
		Unit is in Unoccupied mode and there is no call for heating or cooling.
		Tripped circuit breaker.
		No power to the unit.
		Unit is off via CCN command.
	Actuator is unplugged at motor or at economizer board.	Check wiring connections.
	Unit is not configured for economizer.	Configure unit for economizer per the instructions.
	Outdoor-air temperature is above economizer high temperature lockout.	Adjust the high temperature lockout setting if it is incorrect, otherwise, economizer is operating correctly.
	Outdoor-air temperature is below economizer low temperature lockout.	Adjust the low temperature lockout setting if it is incorrect, otherwise, economizer is operating correctly.
	Communication loss to economizer board.	Check wiring connections.
	Damper is jammed.	Identify the obstruction and safely remove.
Economizer Operation is Limited to Minimum Position.	Minimum position is set incorrectly.	Adjust minimum position setting.
	Outdoor-air temperature is above economizer high temperature lockout.	Adjust the high temperature lockout setting if it is incorrect, otherwise, economizer is operating correctly.
	Outdoor-air temperature is below economizer low temperature lockout.	Adjust the low temperature lockout setting if it is incorrect, otherwise, economizer is operating correctly.
	Enthalpy or differential dry bulb are preventing free cooling.	Check enthalpy and return air compared to outside air temperature.
	Outdoor-air thermistor is faulty.	Replace outdoor-air thermistor.
	Low suction pressure problem with a compressor.	Economizer is operating correctly, identify compressor problem.
Economizer Position is Less Than Minimum Position.	IAQ is controlling minimum damper position.	Adjust the IAQ settings if incorrect, otherwise, the economizer is operating correctly.
	Unit is in Unoccupied mode.	Adjust unit occupied schedule if incorrect, otherwise, economizer is operating correctly.
Economizer Does Not Return to Minimum Position.	Unit is operating under free cooling.	Economizer is operating correctly.
Damper Does Not Close on Power Loss.	Damper is jammed or spring return is backwards.	Identify the obstruction and safely remove.
Outdoor Damper Does Not Fully Close at 0% or Fully Open at 100%.	Economizer actuator is out of calibration or spring return is backwards.	Enter Service Test mode and run the Calibrate Economizer (E.CAL) procedure.
Economizer is Not at Configured Minimum Position	Unit is operating under free cooling or a force is applied to the commanded position.	Economizer is operating correctly.

LEGEND

CCN – Carrier Comfort Network
IAQ – Indoor Air Quality

Heating Troubleshooting

Use the unit Scrolling Marquee display or a CCN device to view the heating status display and the heating diagnostic display (see Appendix A) for information on the heating operation. Check the current alarms and alarm history for any heating alarm codes and correct any causes. (See Table 12.) Verify any unique control configurations per installed site requirements or accessories. If alarms conditions are corrected and cleared, operation of the heat stages and indoor fan may be verified by using the Service Test mode. (See Table 4.)

Gas Heat (48PG Units)

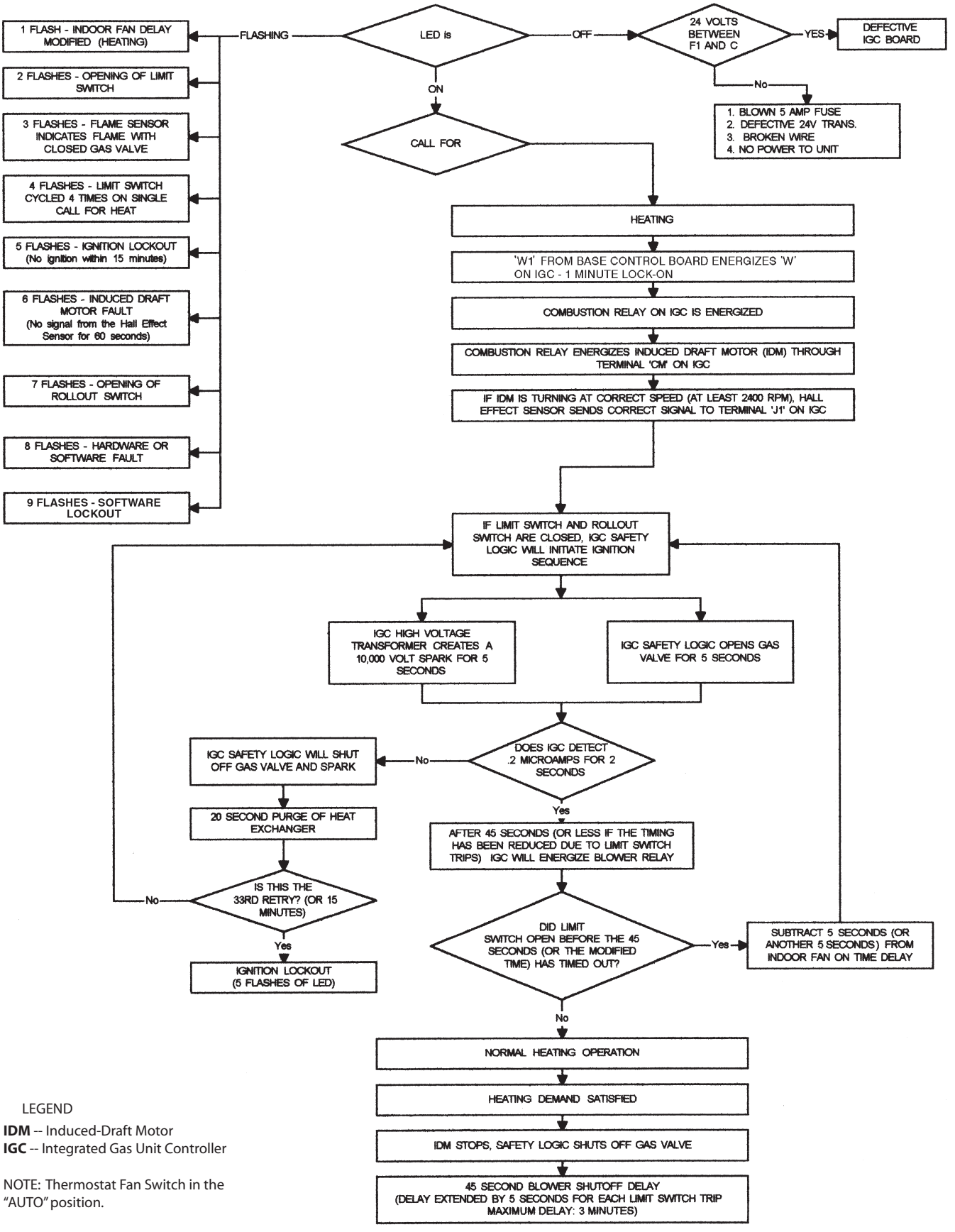
See Table 17 for general gas heating service analysis. See Fig. 21 for service analysis of the IGC board logic. Check the status LED on the IGC board for any flashing alarm codes and correct any causes. (See Table 18.)

Electric Heat (50PG Units)

See Table 19 for electric heating service analysis.

Table 17 – Gas Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Heat Will Not Turn On.	Unit is NOT configured for heat.	Check heating configurations using the *Comfort*Link Scrolling Marquee
Burners Will Not Ignite.	Active alarm.	Check active alarms using *Comfort*Link™ Scrolling Marquee and the IGC flash codes.
	No power to unit.	Check power supply, fuses, wiring, and circuit breakers.
	No power to IGC (Integrated Gas Control).	Check fuses and plugs.
	Heaters off due to time guard to prevent short cycling.	Check using *Comfort*Link Scrolling Marquee and the IGC flash codes.
	Thermostat or occupancy schedule set point not calling for Cooling.	Check using *Comfort*Link Scrolling Marquee.
	No gas at main burners.	Check gas line for air and purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to re-light unit.
	Water in gas line.	Drain water and install drip.
Inadequate Heating.	Dirty air filters.	Replace air filters.
	Gas input too low.	Check gas pressure at manifold. Refer to gas valve adjustment.
	Thermostat or occupancy schedule set point only calling for W1.	Allow time for W2 to energize or adjust setpoints.
	Unit undersized for load.	Decrease load or increase of size of unit.
	Restricted airflow.	Remove restriction. Check SAT compared to the SAT heating limits.
	Too much outdoor air.	Check economizer position and configuration. Adjust minimum position using *Comfort*Link Scrolling Marquee.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
Poor Flame Characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger, replace.
		Unit is over-fired, reduce input. Adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners Will Not Turn Off.	Unit is in Minimum on-time.	Check using *Comfort*Link Scrolling Marquee and the IGC flash codes.
	Unit running in Service Test mode.	Check using *Comfort*Link Scrolling Marquee.
	Main gas valve stuck.	Turn off gas supply and unit power. Replace gas valve.



LEGEND

IDM -- Induced-Draft Motor
IGC -- Integrated Gas Unit Controller

NOTE: Thermostat Fan Switch in the "AUTO" position.

C07014

Fig. 21 – IGC Service Analysis Logic

Table 18 – IGC Board LED Alarm Codes

LED FLASH CODE	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
On	Normal Operation	—	—	—
Off	Hardware Failure	No gas heating.	—	Loss of power to the IGC. Check 5 amp fuse on IGC, power to unit, 24V circuit breaker, transformer, and wiring to the IGC.
1 Flash	Indoor Fan On/Off Delay Modified	5 seconds subtracted from On delay. 5 seconds added to Off delay (3 min max).	Power reset.	High temperature limit switch opens during heat exchanger warm-up period before fan-on delay expires. High temperature limit switch opens within 10 minutes of heat call (W) Off. See Limit Switch Fault.
2 Flashes	Limit Switch Fault	Gas valve and igniter Off. Indoor fan and inducer On.	Limit switch closed, or heat call (W) Off.	High temperature limit switch is open. Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is within the range on the unit nameplate. Check wiring and limit switch operation.
3 Flashes	Flame Sense Fault	Indoor fan and inducer On.	Flame sense normal. Power reset for LED reset.	The IGC sensed a flame when the gas valve should be closed. Check wiring, flame sensor, and gas valve operation.
4 Flashes	Four Consecutive Limit Switch Fault	No gas heating.	Heat call (W) Off. Power reset for LED reset.	4 consecutive limit switch faults within a single call for heat. See Limit Switch Fault.
5 Flashes	Ignition Fault	No gas heating.	Heat call (W) Off. Power reset for LED reset.	Unit unsuccessfully attempted ignition for 15 minutes. Check igniter and flame sensor electrode spacing, gaps, etc. Check flame sense and igniter wiring. Check gas valve operation and gas supply.
6 Flashes	Induced Draft Motor Fault	If heat off: no gas heating. If heat on: gas valve Off and inducer On.	Inducer sense normal, or heat call (W) Off.	Inducer sense On when heat call Off, or inducer sense Off when heat call On. Check wiring, voltage, and operation of IGC motor. Check speed sensor wiring to IGC.
7 Flashes	Rollout Switch Lockout	Gas valve and igniter Off. Indoor fan and inducer On.	Power reset.	Rollout switch has opened. Check gas valve operation. Check induced-draft blower wheel is properly secured to motor shaft.
8 Flashes	Internal Control Lockout	No gas heating.	Power reset.	IGC has sensed internal hardware or software error. If fault is not cleared by resetting 24 v power, replace the IGC.
9 Flashes	Temporary Software Lockout	No gas heating.	1 hour auto reset, or power reset.	Electrical interference is disrupting the IGC software.

LEGEND

IGC – Integrated Gas Unit Control
LED – Light–Emitting Diode

NOTES:

1. There is a 3–second pause between alarm code displays.
2. If more than one alarm code exists, all applicable alarm codes will be displayed in numerical sequence.
3. Alarm codes on the IGC will be lost if power to the unit is interrupted.

Table 19 – Electric Heat Service Analysis

PROBLEM	CAUSE	REMEDY
Heat Will Not Turn On.	Active alarm.	Check active alarms using *Comfort*Link™ Scrolling Marquee.
	Unit is NOT configured for heat.	Check heating configurations using the *Comfort*Link Scrolling Marquee
	No power to unit.	Check power supply, fuses, wiring, and circuit breakers.
	Unit is in minimum heat off-time, or minimum cool-heat changeover time.	Check using *Comfort*Link Scrolling Marquee.
	Thermostat or occupancy schedule setpoint not calling for heating.	Check using *Comfort*Link Scrolling Marquee.
	Heat forced off in Service Test mode.	Check using *Comfort*Link Scrolling Marquee. Turn Service Test mode off.
	No 24 vac at heater contactor.	Check transformer and circuit breaker.
		Check auto-reset limit switches on heater.
		Check manual-reset limit switch (LS) on indoor fan housing.
	Open temperature limit switch on heater.	Check minimum airflow. Check limit switch when it is cool, replace if open.
Inadequate Heating.	Dirty air filters.	Replace air filters.
	Thermostat or occupancy schedule setpoint only calling for W1.	Allow time for W2 to energize or adjust setpoints.
	Heat undersized for load.	Decrease load or increase size of heater.
	Restricted airflow	Remove restriction. Check SAT compared to the SAT heating limits.
	Too much outdoor air.	Check economizer position and configuration. Adjust minimum position.
	Limit switch cycles heaters.	Check rotation of blower and minimum airflow.
	Bad heater elements.	Power off unit and remove high voltage wires. Check resistance of element, replace if open.
Heat Will Not Turn Off.	Unit is in minimum heat on-time.	Check using *Comfort*Link Scrolling Marquee.
	Thermostat or occupancy schedule setpoint still calling for heating.	Check using *Comfort*Link Scrolling Marquee.
	Heat forced on in Service Test mode.	Check using *Comfort*Link Scrolling Marquee. Turn Service Test mode off.
	Heater contactor failed.	Power off unit. Check contactor and replace if closed.

Phase Loss Protection

The phase loss protection option will monitor the three-phase electrical system to provide phase reversal and phase loss protection.

Phase Reversal Protection

If the control senses an incorrect phase relationship, the relay (K1) will be de-energized (opening its contact). If the phase relationship is correct, the relay will be energized. The control has a self-bypass function after a pre-set time. If the control determines that the three phases stay in a correct relationship for 10 consecutive minutes, the relay will stay energized regardless of the phase sequence of three inputs as long as 24-vac control voltage is applied. This self-bypass function will be reset if all three phases are restored in a phase loss event.

Phase Loss Protection

If the reverse rotation board senses any one of the three phase inputs has no AC voltage, the relay will be de−energized (opening its contact). This protection is always active as long as 24-vac control voltage is applied, and is not affected by the self by-pass function of the phase sequence monitoring function. However, in the event of phase loss, the relay will be re-energized only if all three phases are restored and the three phases are in the correct sequence.

A red LED is provided to indicate the function of the board. See the table below.

LED STATUS	FUNCTION
On Continuously	Relay contact closed (normal operation).
Blinking	Relay contact open (phase loss or phase reversal has occurred) — No power will be supplied to the control system.
Off	24 vac control power not present (off).

Thermistor Troubleshooting

The electronic control uses thermistors to sense temperatures used to control operation of the unit. Resistances at various temperatures are listed in Table 20 and 21. Thermistor pin connection points are shown in the Major System Components section. The general locations of the thermistors are shown the Major System Components section.

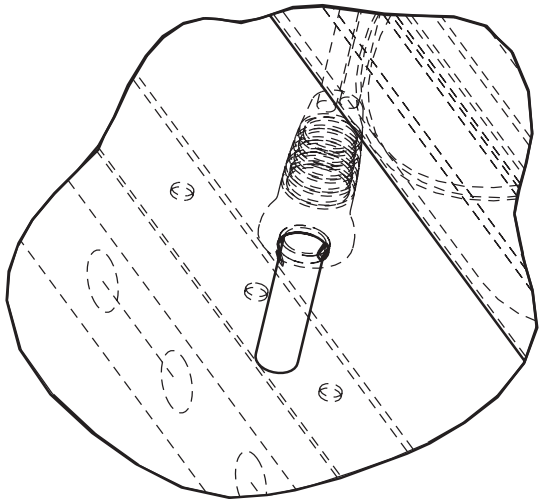
Air Temperatures

Air temperatures are measured with 10 kilo-ohm thermistors. This includes supply-air temperature (SAT), outdoor-air temperature (OAT), space temperature sensors (T55, T56, T58), and return air temperature (RAT).

The supply air temperature (SAT) and outdoor air temperature (OAT) thermistors use a snap-mount to attach through the unit sheet metal panels. The snap-mount tabs must be flattened on the tip end of the sensor to release for removal from the panel. (See Fig. 22.) To reinstall, make sure the snap-mount tabs extend out.

Refrigerant Temperatures

Condenser coil temperatures are measured with 5 kilo-ohm thermistors. These measurements provide an approximate saturated condensing temperature for each circuit (SCT.A, SCT.B, SCT.C). Fig. 23–24 show the factory locations for the SCT thermistors on 48/50PG03−16 units. On 48/50PG20−28 and 48/50PM16−28 units the location is on the component arrangement diagrams. Ensure that thermistors are placed at the correct location and are snapped securely over the return bend so that contact is made between the thermistor and the tube.



C07015

Fig. 22 − SAT and OAT Thermistor Mounting

Thermistor/Temperature Sensor Check

A high quality digital volt-ohmmeter is required to perform this check.

Connect the digital voltmeter across the appropriate thermistor terminals at the J8 terminal strip on the Main Base Board (see Major System Components section).

Using the voltage reading obtained, read the sensor temperature from Table 20 and 21.

To check thermistor accuracy, measure temperature at probe location with an accurate thermocouple-type temperature-measuring instrument. Insulate thermocouple to avoid ambient temperatures from influencing reading. Temperature measured by thermocouple and temperature determined from thermistor voltage reading should be close, within 5°F if care was taken in applying thermocouple and taking readings.

If a more accurate check is required, unit must be shut down and thermistor removed and checked at a known temperature (freezing point or boiling point of water) using either voltage drop measured across thermistor at the J8 terminal, or by determining the resistance with unit shut down and thermistor disconnected from J8. Compare the values determined with the value read by the control in the Temperatures mode using the Scrolling Marquee display.

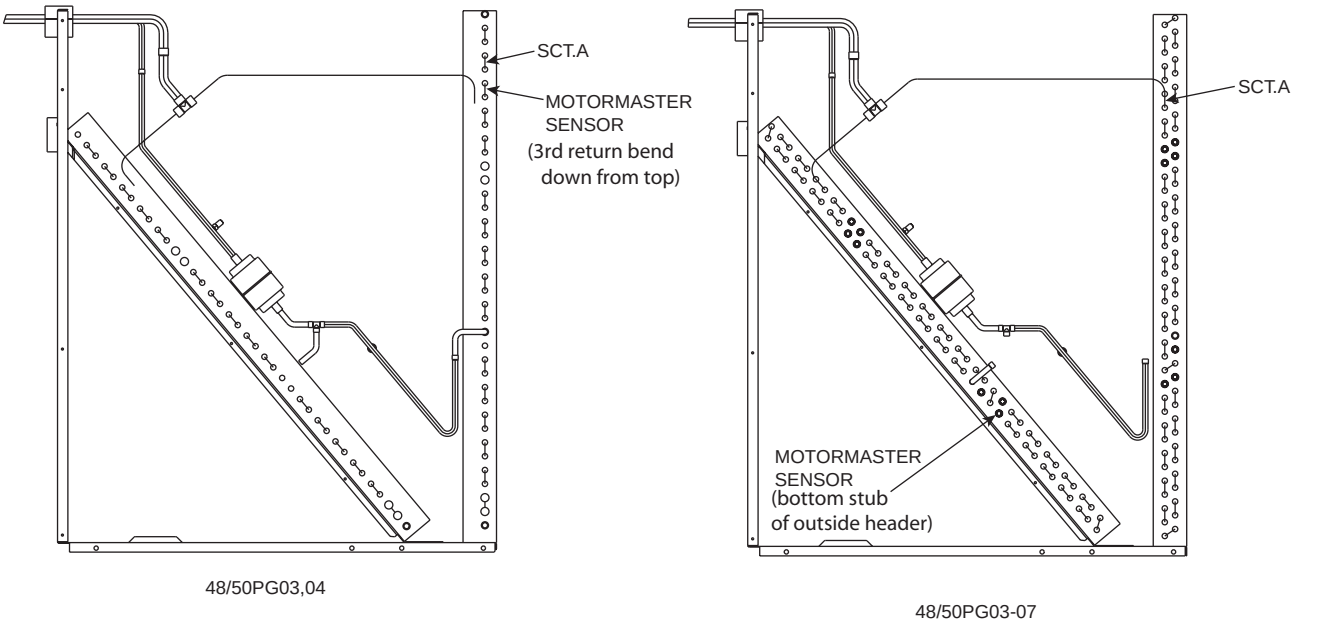


Fig. 23 – Saturated Condensing Temperature Thermistor Location — 48/50PG03–07

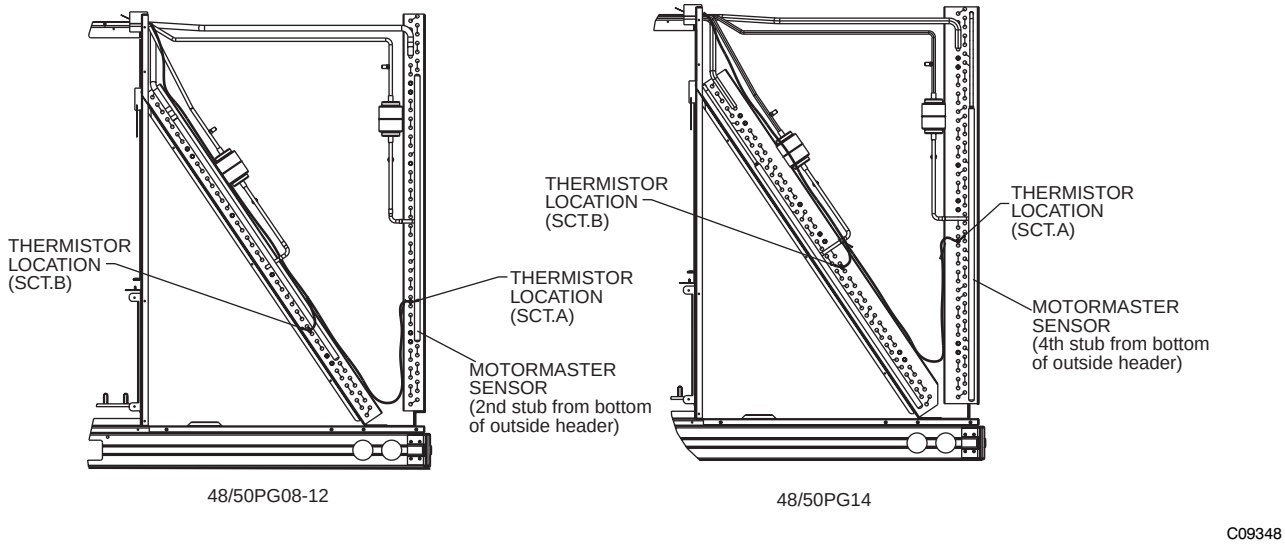


Fig. 24 – Saturated Condensing Temperature Thermistor Location — 48/50PG08–14

Sensor Trim

Corrective offsets can be applied to the space temperature and the supply air temperature sensor readings. These corrections are set in the ***Configuration→TRIM*** menu for the display, or in the ***Maintenance→TRIM*** table for CCN. See the Indoor Air Quality section for available adjustments to IAQ and OAQ sensor readings. The space temperature may be corrected by entering either a calibration temperature value in ***SPT.C***, or an offset temperature value in ***SPT.T***. The supply-air temperature may be corrected by entering either a calibration temperature value in ***SAT.C***, or an offset temperature value in ***SAT.T***. Temperature corrections should only be made if sensor readings are compared to an accurate reference temperature measurement device.

Transducer Troubleshooting

The electronic control uses suction pressure transducers to measure the suction pressure of the refrigerant circuits. The pressure/voltage characteristics of these transducers are in shown in Table 22, the 5vdc power is applied to legs A and B of the transducer and legs B to C represent the signal voltage. To use the voltage drop table for troubleshooting, read the voltage across A and B, then subtract the voltage reading from B to C. This is the voltage drop which can be looked up in table 22. The accuracy of these transducers can be verified by connecting an accurate pressure gauge to the second refrigerant port in the suction line.

Forcing Inputs and Outputs

Many variables may have their value forced through CCN or directly at the local display. This can be useful during diagnostic testing and also during operation, typically as part of an advanced third party control scheme. Input and output points that may be forced are indicated as ‘forcible’ in the write status column of the display and CCN tables.

If the user needs to force a variable, follow the same process as when editing a configuration parameter. A forced variable will be displayed on the Scrolling Marquee with a blinking period “.” following its value. A forced value on Navigator™ accessory is indicated with a blinking “f”. A forced value on CCN devices is indicated with “Control” if forced at the unit display, or “Supervisor” if forced via CCN. To remove a local force with the Scrolling Marquee, select the point with the ENTER key and then press the up-arrow and down-arrow keys simultaneously.

NOTE: In the case of a control power reset, any force in effect at the time of power reset will be cleared.

Table 20 – Temperature (°F) vs Resistance/Voltage Drop Values for OAT, SAT, and SPT Thermistors (10K at 25°C Type II Resistors)

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–25	4.758	196,453	**61**	2.994	14,925	**147**	0.890	2,166
–24	4.750	189,692	**62**	2.963	14,549	**148**	0.876	2,124
–23	4.741	183,300	**63**	2.932	14,180	**149**	0.862	2,083
–22	4.733	177,000	**64**	2.901	13,824	**150**	0.848	2,043
–21	4.724	171,079	**65**	2.870	13,478	**151**	0.835	2,003
–20	4.715	165,238	**66**	2.839	13,139	**152**	0.821	1,966
–19	4.705	159,717	**67**	2.808	12,814	**153**	0.808	1,928
–18	4.696	154,344	**68**	2.777	12,493	**154**	0.795	1,891
–17	4.686	149,194	**69**	2.746	12,187	**155**	0.782	1,855
–16	4.676	144,250	**70**	2.715	11,884	**156**	0.770	1,820
–15	4.665	139,443	**71**	2.684	11,593	**157**	0.758	1,786
–14	4.655	134,891	**72**	2.653	11,308	**158**	0.745	1,752
–13	4.644	130,402	**73**	2.622	11,031	**159**	0.733	1,719
–12	4.633	126,183	**74**	2.592	10,764	**160**	0.722	1,687
–11	4.621	122,018	**75**	2.561	10,501	**161**	0.710	1,656
–10	4.609	118,076	**76**	2.530	10,249	**162**	0.699	1,625
–9	4.597	114,236	**77**	2.500	10,000	**163**	0.687	1,594
–8	4.585	110,549	**78**	2.470	9,762	**164**	0.676	1,565
–7	4.572	107,006	**79**	2.439	9,526	**165**	0.666	1,536
–6	4.560	103,558	**80**	2.409	9,300	**166**	0.655	1,508
–5	4.546	100,287	**81**	2.379	9,078	**167**	0.645	1,480
–4	4.533	97,060	**82**	2.349	8,862	**168**	0.634	1,453
–3	4.519	94,020	**83**	2.319	8,653	**169**	0.624	1,426
–2	4.505	91,019	**84**	2.290	8,448	**170**	0.614	1,400
–1	4.490	88,171	**85**	2.260	8,251	**171**	0.604	1,375
0	4.476	85,396	**86**	2.231	8,056	**172**	0.595	1,350
1	4.461	82,729	**87**	2.202	7,869	**173**	0.585	1,326
2	4.445	80,162	**88**	2.173	7,685	**174**	0.576	1,302
3	4.429	77,662	**89**	2.144	7,507	**175**	0.567	1,278
4	4.413	75,286	**90**	2.115	7,333	**176**	0.558	1,255
5	4.397	72,940	**91**	2.087	7,165	**177**	0.549	1,233
6	4.380	70,727	**92**	2.059	6,999	**178**	0.540	1,211
7	4.363	68,542	**93**	2.030	6,838	**179**	0.532	1,190
8	4.346	66,465	**94**	2.003	6,683	**180**	0.523	1,169
9	4.328	64,439	**95**	1.975	6,530	**181**	0.515	1,148
10	4.310	62,491	**96**	1.948	6,383	**182**	0.507	1,128
11	4.292	60,612	**97**	1.921	6,238	**183**	0.499	1,108
12	4.273	58,781	**98**	1.894	6,098	**184**	0.491	1,089
13	4.254	57,039	**99**	1.867	5,961	**185**	0.483	1,070
14	4.235	55,319	**100**	1.841	5,827	**186**	0.476	1,052
15	4.215	53,693	**101**	1.815	5,698	**187**	0.468	1,033
16	4.195	52,086	**102**	1.789	5,571	**188**	0.461	1,016
17	4.174	50,557	**103**	1.763	5,449	**189**	0.454	998
18	4.153	49,065	**104**	1.738	5,327	**190**	0.447	981
19	4.132	47,627	**105**	1.713	5,210	**191**	0.440	964
20	4.111	46,240	**106**	1.688	5,095	**192**	0.433	947
21	4.089	44,888	**107**	1.663	4,984	**193**	0.426	931
22	4.067	43,598	**108**	1.639	4,876	**194**	0.419	915
23	4.044	42,324	**109**	1.615	4,769	**195**	0.413	900
24	4.021	41,118	**110**	1.591	4,666	**196**	0.407	885
25	3.998	39,926	**111**	1.567	4,564	**197**	0.400	870
26	3.975	38,790	**112**	1.544	4,467	**198**	0.394	855
27	3.951	37,681	**113**	1.521	4,370	**199**	0.388	841
28	3.927	36,610	**114**	1.498	4,277	**200**	0.382	827
29	3.903	35,577	**115**	1.475	4.185	**201**	0.376	814
30	3.878	34,569	**116**	1.453	4,096	**202**	0.370	800
31	3.853	33,606	**117**	1.431	4,008	**203**	0.365	787
32	3.828	32,654	**118**	1.409	3,923	**204**	0.359	774
33	3.802	31,752	**119**	1.387	3,840	**205**	0.354	762
34	3.776	30,860	**120**	1.366	3,759	**206**	0.349	749
35	3.750	30,009	**121**	1.345	3,681	**207**	0.343	737
36	3.723	29,177	**122**	1.324	3,603	**208**	0.338	725
37	3.697	28,373	**123**	1.304	3,529	**209**	0.333	714
38	3.670	27,597	**124**	1.284	3,455	**210**	0.328	702
39	3.654	26,838	**125**	1.264	3,383	**211**	0.323	691
40	3.615	26,113	**126**	1.244	3,313	**212**	0.318	680
41	3.587	25,396	**127**	1.225	3,244	**213**	0.314	670
42	3.559	24,715	**128**	1.206	3,178	**214**	0.309	659
43	3.531	24,042	**129**	1.187	3,112	**215**	0.305	649
44	3.503	23,399	**130**	1.168	3,049	**216**	0.300	639
45	3.474	22,770	**131**	1.150	2,986	**217**	0.296	629
46	3.445	22,161	**132**	1.132	2,926	**218**	0.292	620
47	3.416	21,573	**133**	1.114	2,866	**219**	0.288	610
48	3.387	20,998	**134**	1.096	2,809	**220**	0.284	601
49	3.357	20,447	**135**	1.079	2,752	**221**	0.279	592
50	3.328	19,903	**136**	1.062	2,697	**222**	0.275	583
51	3.298	19,386	**137**	1.045	2,643	**223**	0.272	574
52	3.268	18,874	**138**	1.028	2,590	**224**	0.268	566
53	3.238	18,384	**139**	1.012	2,539	**225**	0.264	557
54	3.208	17,904	**140**	0.996	2,488			
55	3.178	17,441	**141**	0.980	2,439			
56	3.147	16,991	**142**	0.965	2,391			
57	3.117	16,552	**143**	0.949	2,343			
58	3.086	16,131	**144**	0.934	2,297			
59	3.056	15,714	**145**	0.919	2,253			
60	3.025	15,317	**146**	0.905	2,209			

Table 21 – Temperature (°F) vs. Resistance/Voltage Drop Values for SCT Sensors (5K at 25°C Resistors)

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–25	3.699	98,010	**59**	1.982	7,866	**143**	0.511	1,190
–24	3.689	94,707	**60**	1.956	7,665	**144**	0.502	1,165
–23	3.679	91,522	**61**	1.930	7,468	**145**	0.494	1,141
–22	3.668	88,449	**62**	1.905	7,277	**146**	0.485	1,118
–21	3.658	85,486	**63**	1.879	7,091	**147**	0.477	1,095
–20	3.647	82,627	**64**	1.854	6,911	**148**	0.469	1,072
–19	3.636	79,871	**65**	1.829	6,735	**149**	0.461	1,050
–18	3.624	77,212	**66**	1.804	6,564	**150**	0.453	1,029
–17	3.613	74,648	**67**	1.779	6,399	**151**	0.445	1,007
–16	3.601	72,175	**68**	1.754	6,238	**152**	0.438	986
–15	3.588	69,790	**69**	1.729	6,081	**153**	0.430	965
–14	3.576	67,490	**70**	1.705	5,929	**154**	0.423	945
–13	3.563	65,272	**71**	1.681	5,781	**155**	0.416	925
–12	3.550	63,133	**72**	1.656	5,637	**156**	0.408	906
–11	3.536	61,070	**73**	1.632	5,497	**157**	0.402	887
–10	3.523	59,081	**74**	1.609	5,361	**158**	0.395	868
–9	3.509	57,162	**75**	1.585	5,229	**159**	0.388	850
–8	3.494	55,311	**76**	1.562	5,101	**160**	0.381	832
–7	3.480	53,526	**77**	1.538	4,976	**161**	0.375	815
–6	3.465	51,804	**78**	1.516	4,855	**162**	0.369	798
–5	3.450	50,143	**79**	1.493	4,737	**163**	0.362	782
–4	3.434	48,541	**80**	1.470	4,622	**164**	0.356	765
–3	3.418	46,996	**81**	1.448	4,511	**165**	0.350	750
–2	3.402	45,505	**82**	1.426	4,403	**166**	0.344	734
–1	3.386	44,066	**83**	1.404	4,298	**167**	0.339	719
0	3.369	42,679	**84**	1.382	4,196	**168**	0.333	705
1	3.352	41,339	**85**	1.361	4,096	**169**	0.327	690
2	3.335	40,047	**86**	1.340	4,000	**170**	0.322	677
3	3.317	38,800	**87**	1.319	3,906	**171**	0.317	663
4	3.299	37,596	**88**	1.298	3,814	**172**	0.311	650
5	3.281	36,435	**89**	1.278	3,726	**173**	0.306	638
6	3.262	35,313	**90**	1.257	3,640	**174**	0.301	626
7	3.243	34,231	**91**	1.237	3,556	**175**	0.296	614
8	3.224	33,185	**92**	1.217	3,474	**176**	0.291	602
9	3.205	32,176	**93**	1.198	3,395	**177**	0.286	591
10	3.185	31,202	**94**	1.179	3,318	**178**	0.282	581
11	3.165	30,260	**95**	1.160	3,243	**179**	0.277	570
12	3.145	29,351	**96**	1.141	3,170	**180**	0.272	561
13	3.124	28,473	**97**	1.122	3,099	**181**	0.268	551
14	3.103	27,624	**98**	1.104	3,031	**182**	0.264	542
15	3.082	26,804	**99**	1.086	2,964	**183**	0.259	533
16	3.060	26,011	**100**	1.068	2,898	**184**	0.255	524
17	3.038	25,245	**101**	1.051	2,835	**185**	0.251	516
18	3.016	24,505	**102**	1.033	2,773	**186**	0.247	508
19	2.994	23,789	**103**	1.016	2,713	**187**	0.243	501
20	2.972	23,096	**104**	0.999	2,655	**188**	0.239	494
21	2.949	22,427	**105**	0.983	2,597	**189**	0.235	487
22	2.926	21,779	**106**	0.966	2,542	**190**	0.231	480
23	2.903	21,153	**107**	0.950	2,488	**191**	0.228	473
24	2.879	20,547	**108**	0.934	2,436	**192**	0.224	467
25	2.856	19,960	**109**	0.918	2,385	**193**	0.220	461
26	2.832	19,393	**110**	0.903	2,335	**194**	0.217	456
27	2.808	18,843	**111**	0.888	2,286	**195**	0.213	450
28	2.784	18,311	**112**	0.873	2,239	**196**	0.210	445
29	2.759	17,796	**113**	0.858	2,192	**197**	0.206	439
30	2.735	17,297	**114**	0.843	2,147	**198**	0.203	434
31	2.710	16,814	**115**	0.829	2,103	**199**	0.200	429
32	2.685	16,346	**116**	0.815	2,060	**200**	0.197	424
33	2.660	15,892	**117**	0.801	2,018	**201**	0.194	419
34	2.634	15,453	**118**	0.787	1,977	**202**	0.191	415
35	2.609	15,027	**119**	0.774	1,937	**203**	0.188	410
36	2.583	14,614	**120**	0.761	1,898	**204**	0.185	405
37	2.558	14,214	**121**	0.748	1,860	**205**	0.182	401
38	2.532	13,826	**122**	0.735	1,822	**206**	0.179	396
39	2.506	13,449	**123**	0.723	1,786	**207**	0.176	391
40	2.480	13,084	**124**	0.710	1,750	**208**	0.173	386
41	2.454	12,730	**125**	0.698	1,715	**209**	0.171	382
42	2.428	12,387	**126**	0.686	1,680	**210**	0.168	377
43	2.402	12,053	**127**	0.674	1,647	**211**	0.165	372
44	2.376	11,730	**128**	0.663	1,614	**212**	0.163	367
45	2.349	11,416	**129**	0.651	1,582	**213**	0.160	361
46	2.323	11,112	**130**	0.640	1,550	**214**	0.158	356
47	2.296	10,816	**131**	0.629	1,519	**215**	0.155	350
48	2.270	10,529	**132**	0.618	1,489	**216**	0.153	344
49	2.244	10,250	**133**	0.608	1,459	**217**	0.151	338
50	2.217	9,979	**134**	0.597	1,430	**218**	0.148	332
51	2.191	9,717	**135**	0.587	1,401	**219**	0.146	325
52	2.165	9,461	**136**	0.577	1,373	**220**	0.144	318
53	2.138	9,213	**137**	0.567	1,345	**221**	0.142	311
54	2.112	8,973	**138**	0.557	1,318	**222**	0.140	304
55	2.086	8,739	**139**	0.548	1,291	**223**	0.138	297
56	2.060	8,511	**140**	0.538	1,265	**224**	0.135	289
57	2.034	8,291	**141**	0.529	1,240	**225**	0.133	282
58	2.008	8,076	**142**	0.520	1,214			

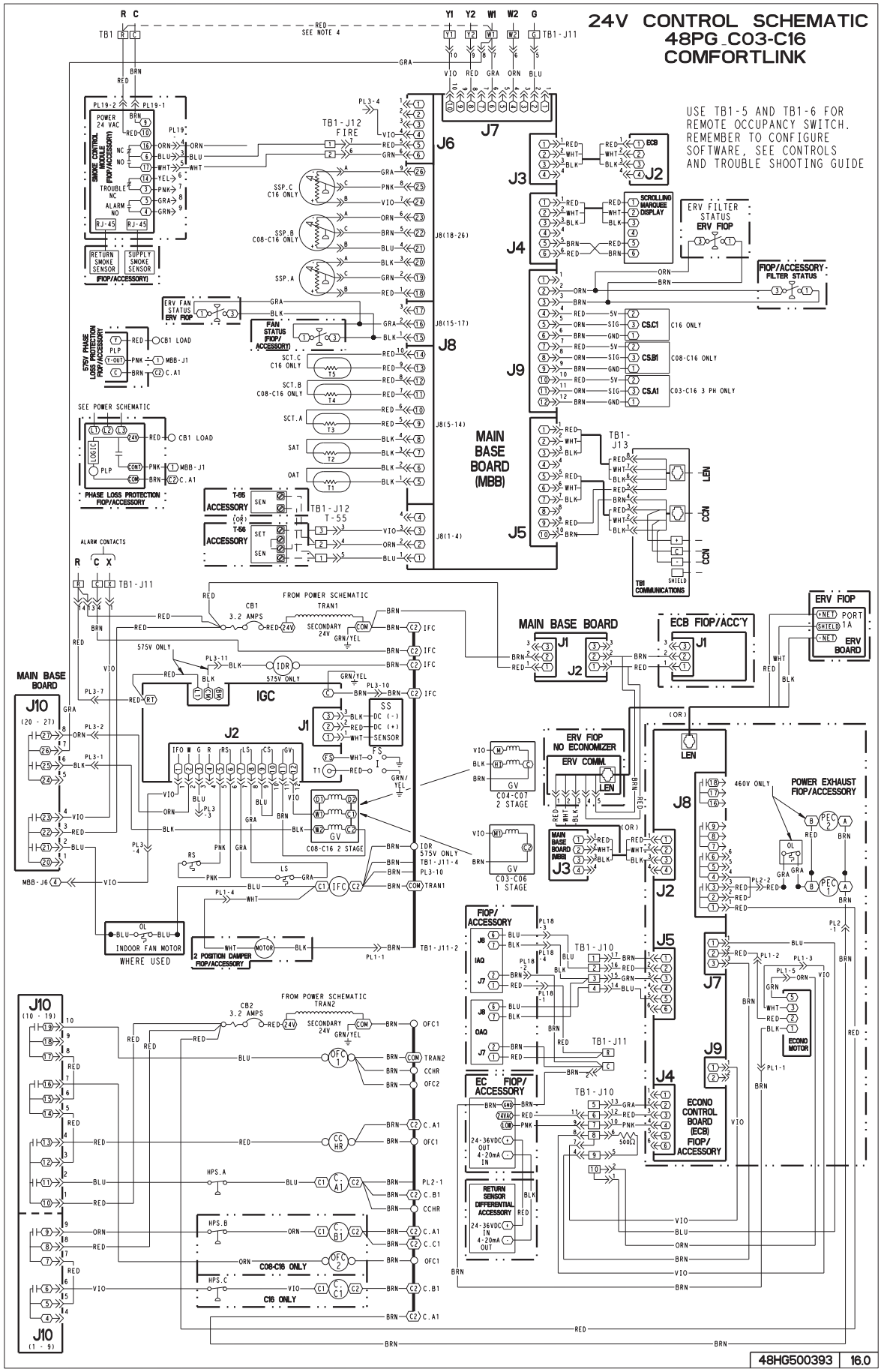
Table 22 – Pressure (psig) vs. Voltage Drop Values for Suction Pressure Transducers

PRESSURE (psig)	VOLTAGE DROP (V)		PRESSURE (psig)	VOLTAGE DROP (V)		PRESSURE (psig)	VOLTAGE DROP (V)		PRESSURE (psig)	VOLTAGE DROP (V)
0	0.465		**68**	1.135		**136**	1.804		**204**	2.474
2	0.485		**70**	1.154		**138**	1.824		**206**	2.493
4	0.505		**72**	1.174		**140**	1.844		**208**	2.513
6	0.524		**74**	1.194		**142**	1.863		**210**	2.533
8	0.544		**76**	1.214		**144**	1.883		**212**	2.553
10	0.564		**78**	1.233		**146**	1.903		**214**	2.572
12	0.583		**80**	1.253		**148**	1.922		**216**	2.592
14	0.603		**82**	1.273		**150**	1.942		**218**	2.612
16	0.623		**84**	1.292		**152**	1.962		**220**	2.631
18	0.642		**86**	1.312		**154**	1.982		**222**	2.651
20	0.662		**88**	1.332		**156**	2.001		**224**	2.671
22	0.682		**90**	1.351		**158**	2.021		**226**	2.690
24	0.702		**92**	1.371		**160**	2.041		**228**	2.710
26	0.721		**94**	1.391		**162**	2.060		**230**	2.730
28	0.741		**96**	1.410		**164**	2.080		**232**	2.749
30	0.761		**98**	1.430		**166**	2.100		**234**	2.769
32	0.780		**100**	1.450		**168**	2.119		**236**	2.789
34	0.800		**102**	1.470		**170**	2.139		**238**	2.809
36	0.820		**104**	1.489		**172**	2.159		**240**	2.828
38	0.839		**106**	1.509		**174**	2.178		**242**	2.848
40	0.859		**108**	1.529		**176**	2.198		**244**	2.868
42	0.879		**110**	1.548		**178**	2.218		**246**	2.887
44	0.898		**112**	1.568		**180**	2.237		**248**	2.907
46	0.918		**114**	1.588		**182**	2.257		**250**	2.927
48	0.938		**116**	1.607		**184**	2.277		**252**	2.946
50	0.958		**118**	1.627		**186**	2.297		**254**	2.966
52	0.977		**120**	1.647		**188**	2.316		**256**	2.986
54	0.997		**122**	1.666		**190**	2.336		**258**	3.005
56	1.017		**124**	1.686		**192**	2.356		**260**	3.025
58	1.036		**126**	1.706		**194**	2.375		**262**	3.045
60	1.056		**128**	1.726		**196**	2.395		**264**	3.065
62	1.076		**130**	1.745		**198**	2.415		**266**	3.084
64	1.095		**132**	1.765		**200**	2.434		**268**	3.104
66	1.115		**134**	1.785		**202**	2.454		**270**	3.124

MAJOR SYSTEM COMPONENTS

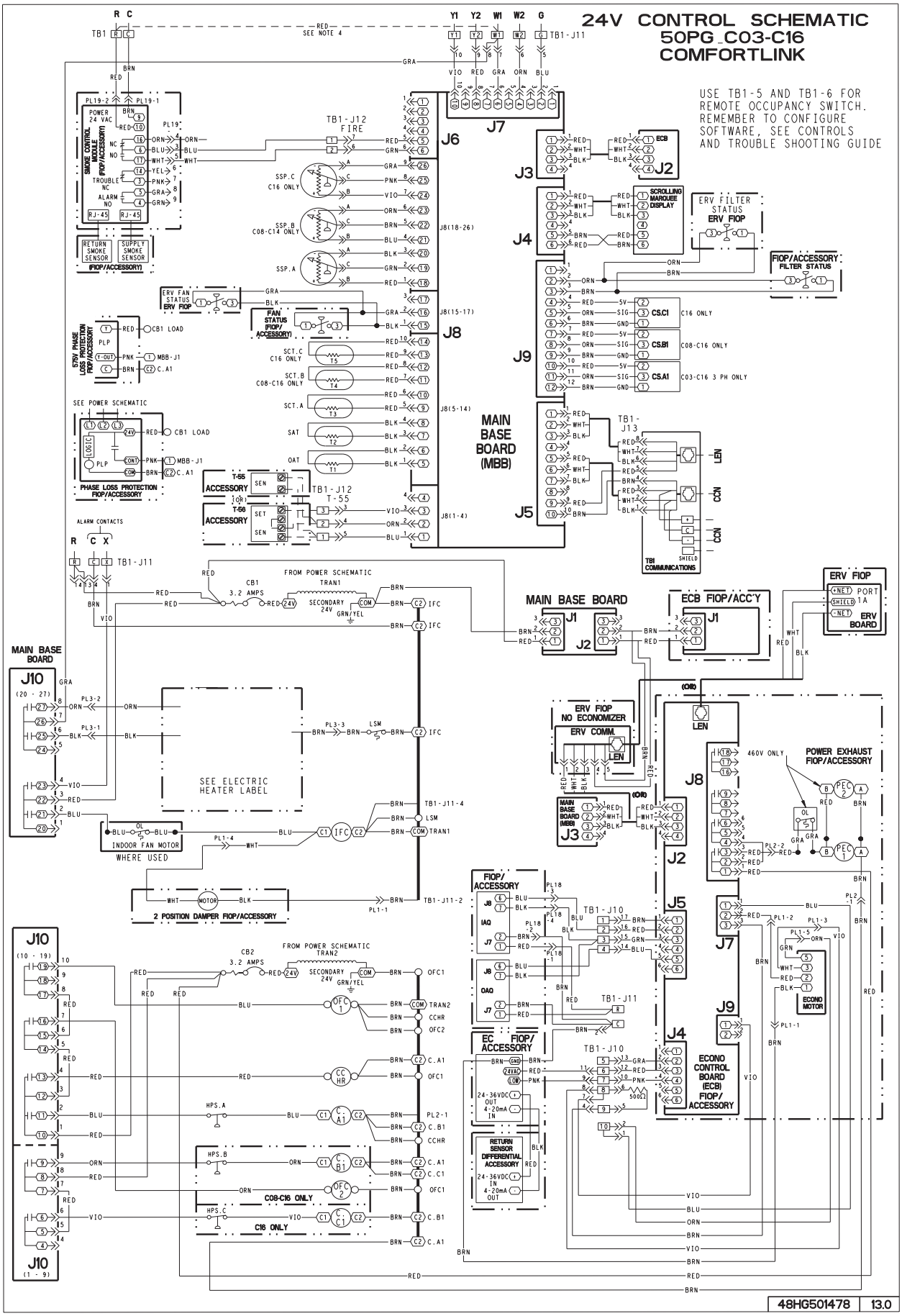
General

The 48/50PG and 48/50PM single package rooftop units contain the *Comfort*Link™ electronic control system that monitors all operations of the rooftop. The control system is composed of several main control components and available factory-installed options or field-installed accessories as listed in sections below. See Fig. 25–36 for the control and power schematics for 48/50PG. See Fig. 31–36 for the control and power schematics for 48/50PM. Fig. 37 shows the layout of the control box, unit, and thermistor and transducer locations for the 48/50PG and Fig. 38–39 for the 48/50PM.



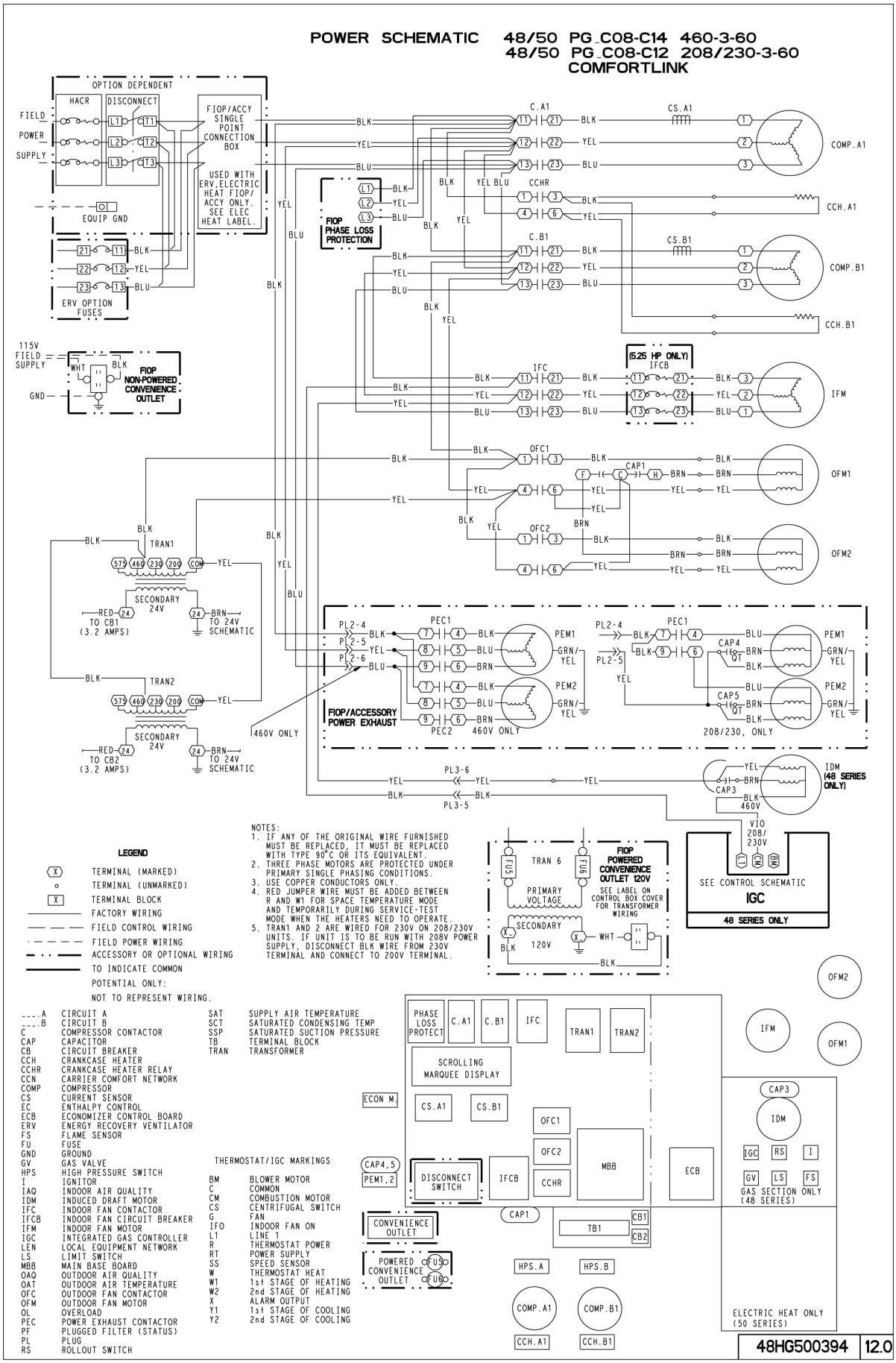
C08549

Fig. 25 – 48PG03–16 Control Wiring Schematic



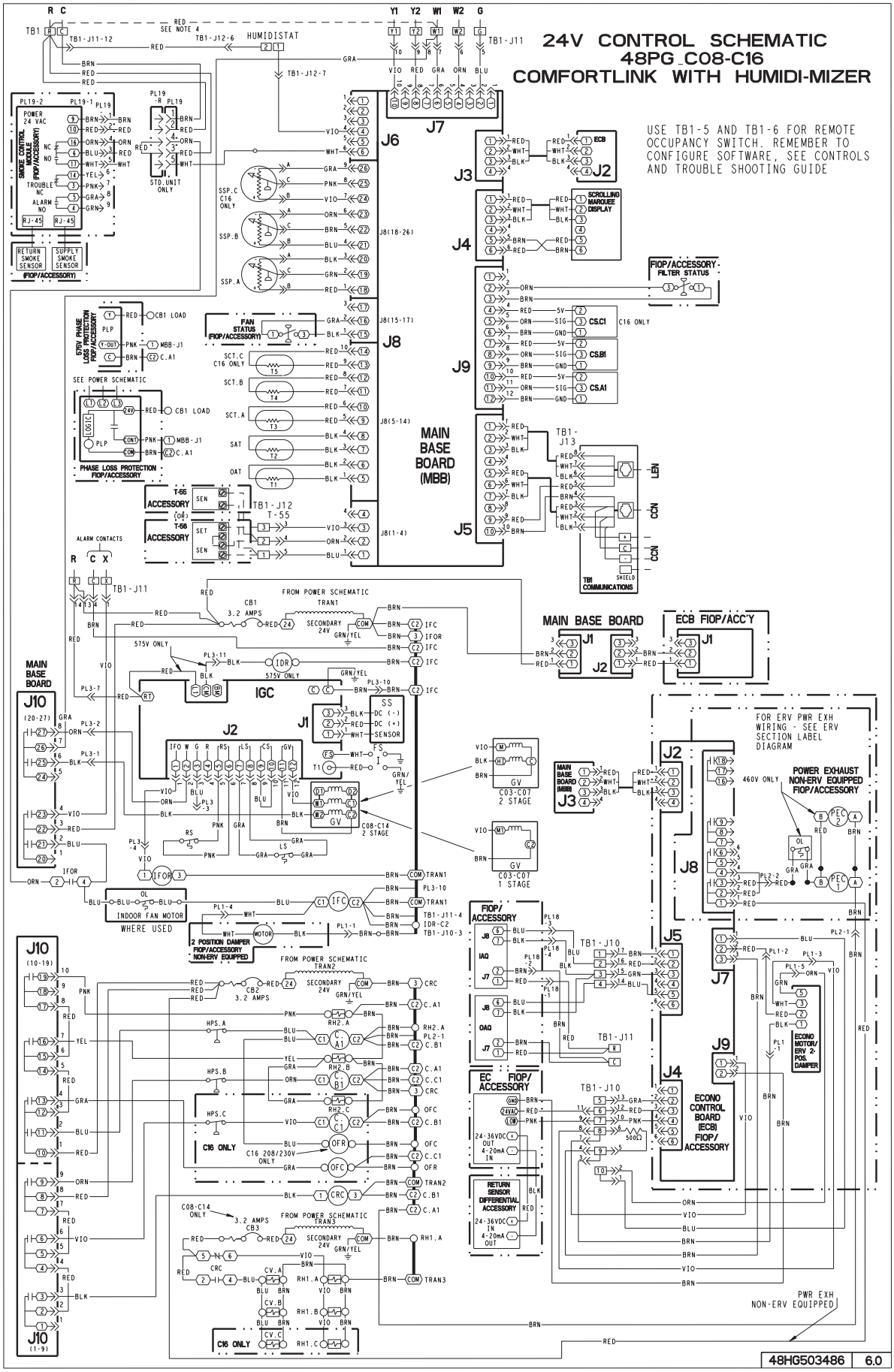
C08550

Fig. 26 – 50PG03–16 Control Wiring Schematic



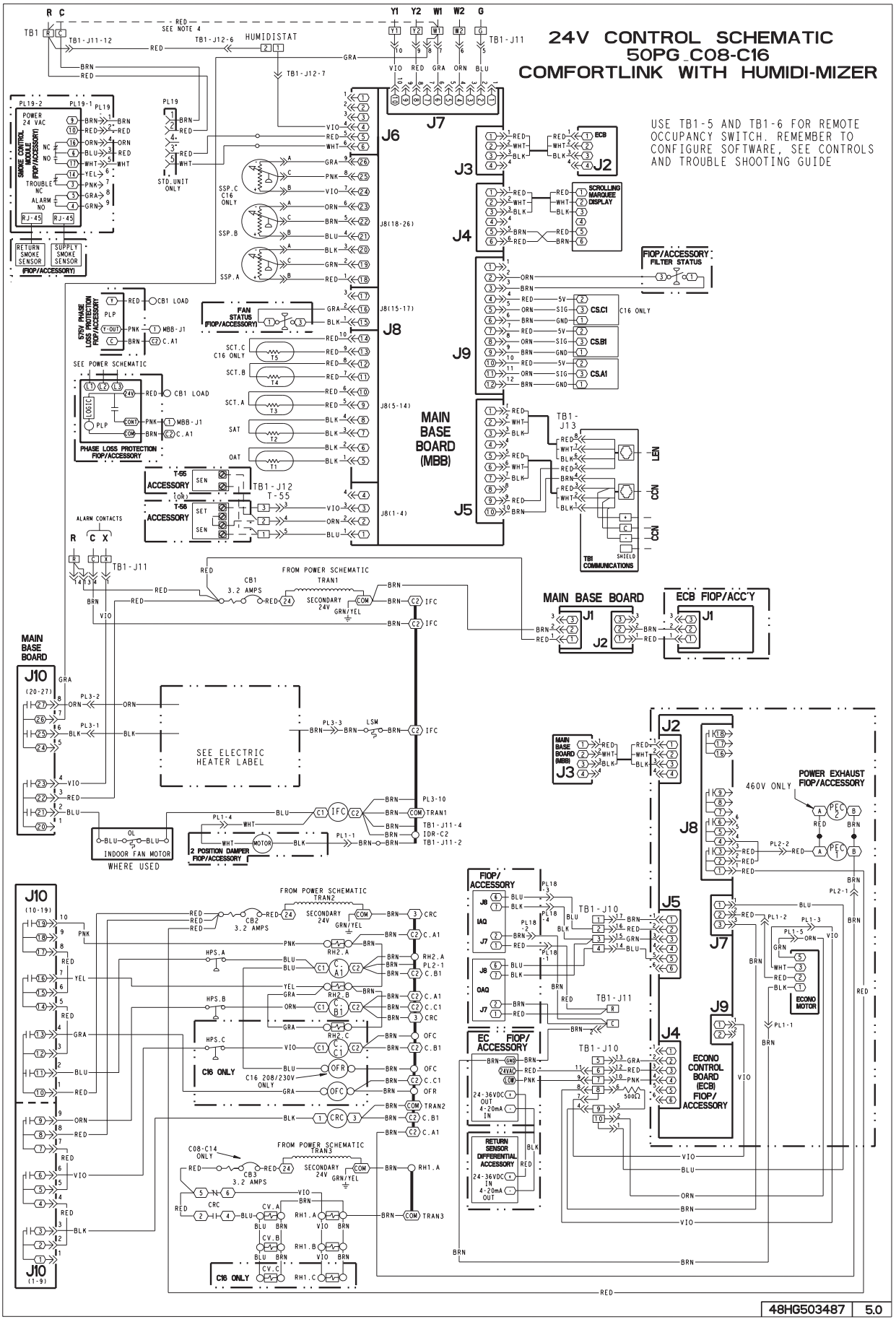
C101249

Fig. 27 – Typical 48/50PG03–14 Power Wiring Schematic and Legend (48/50PG08–14 Shown)



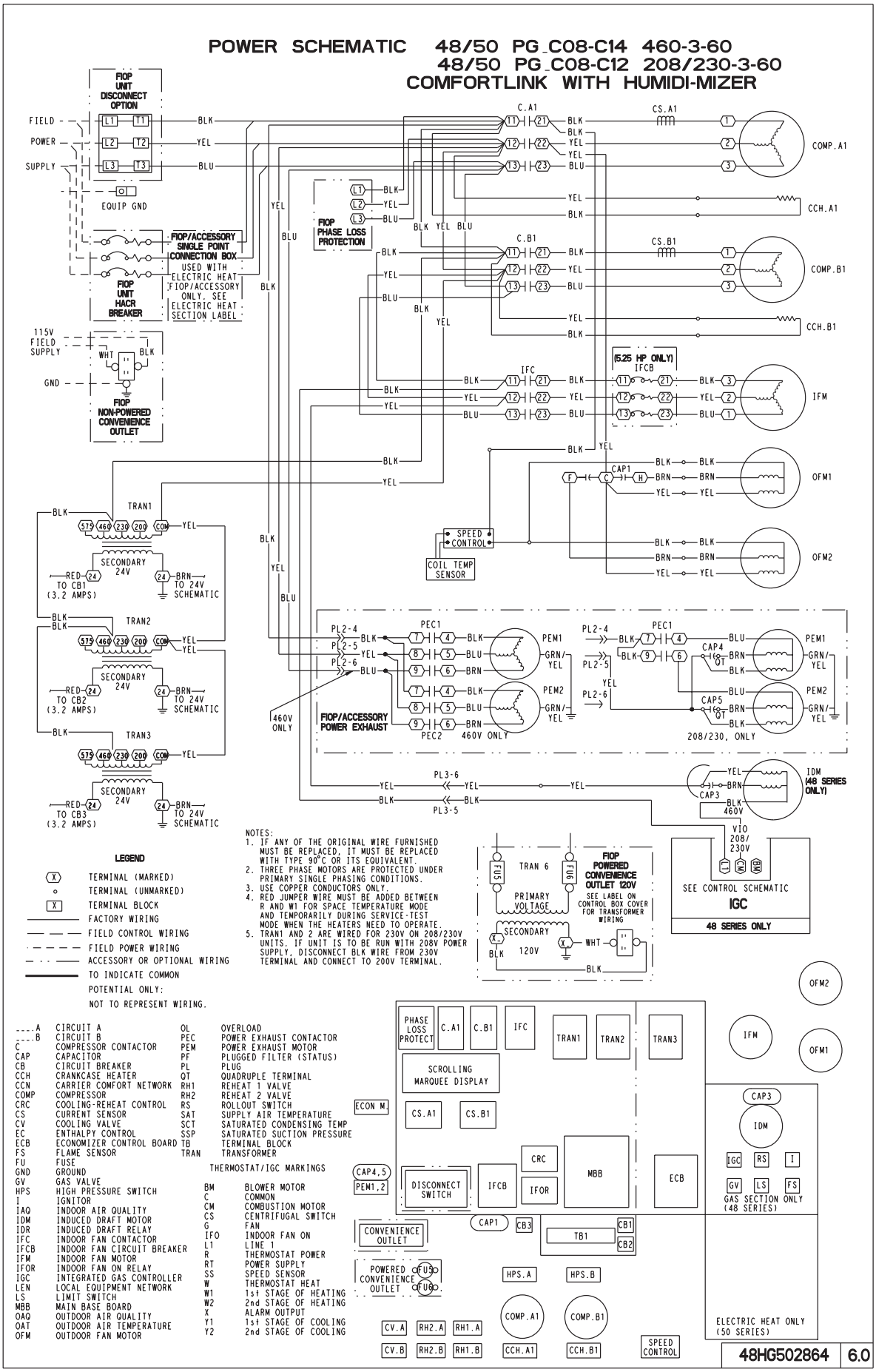
C08552

Fig. 28 – Typical 48PG03–16 with Humidi–MiZer™ System Control Wiring Schematic(48PG08–16 Shown)



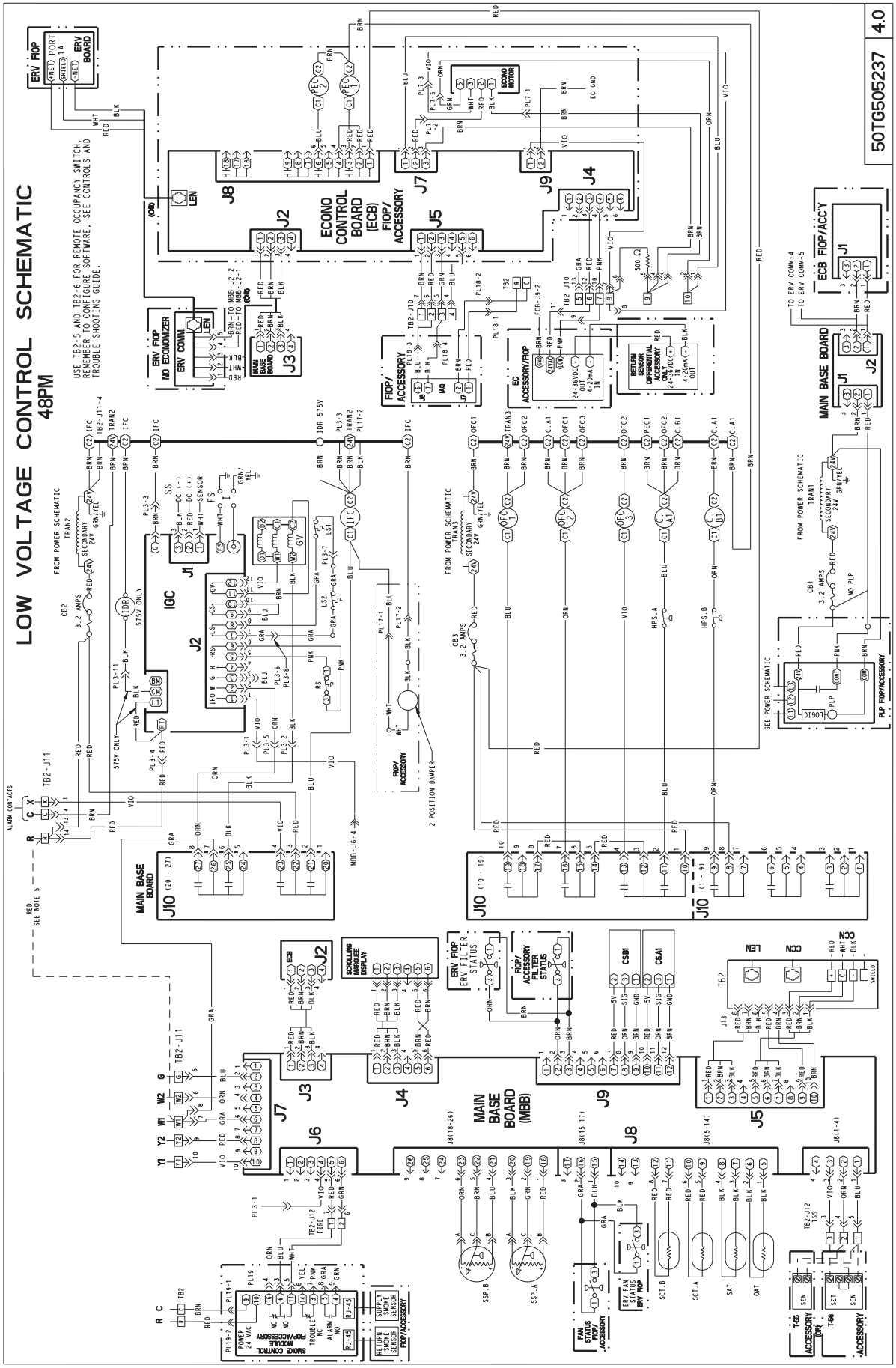
C08554

Fig. 29 – Typical 50PG03–16 with Humidi–MiZer™ System Control Wiring Schematic(50PG08–16 Shown)



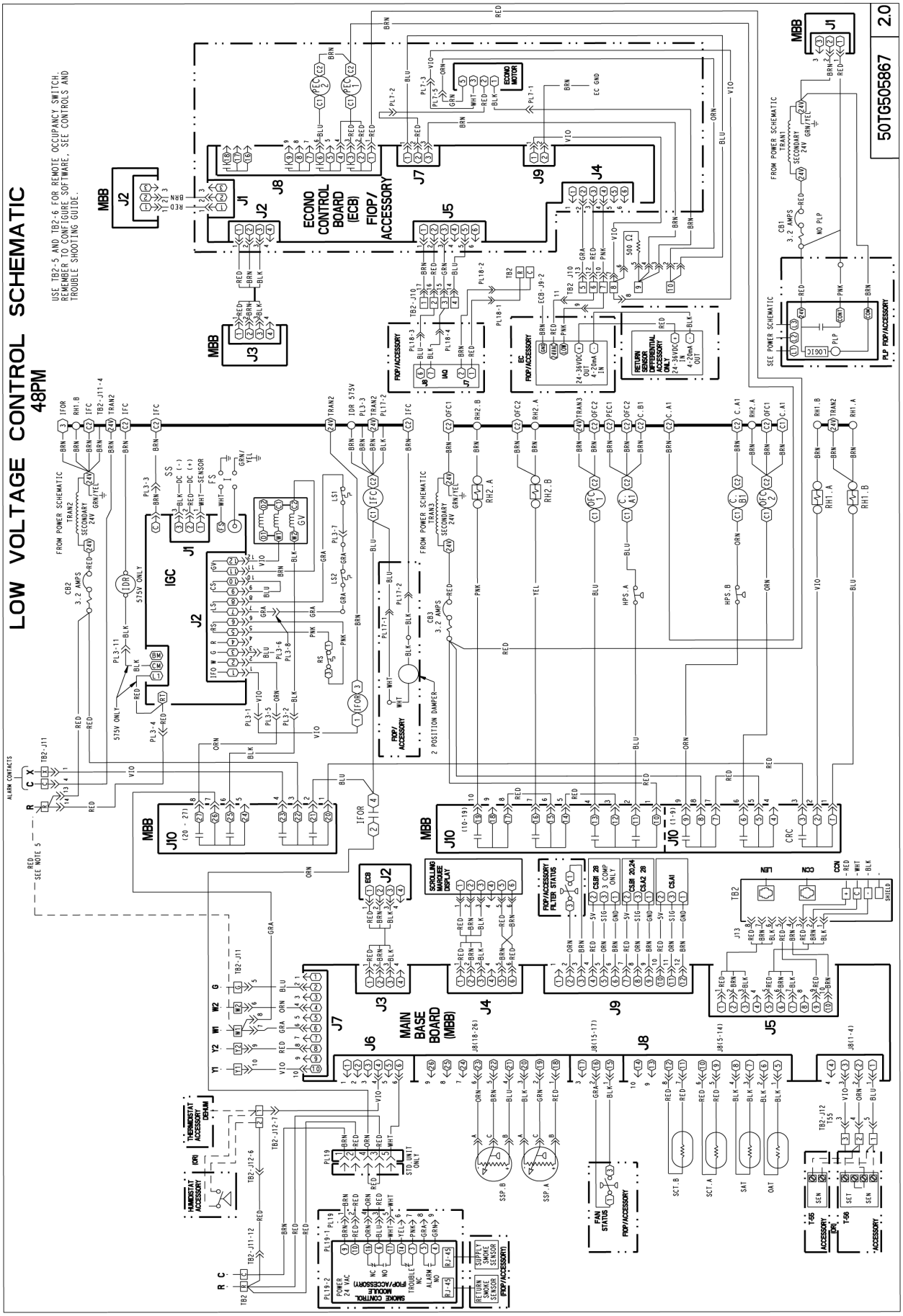
C101250

Fig. 30 – Typical 48/50PG03–14 with Humidi–MiZer™ System Power Wiring Schematic and Legend (48/50PG08–14 Shown)



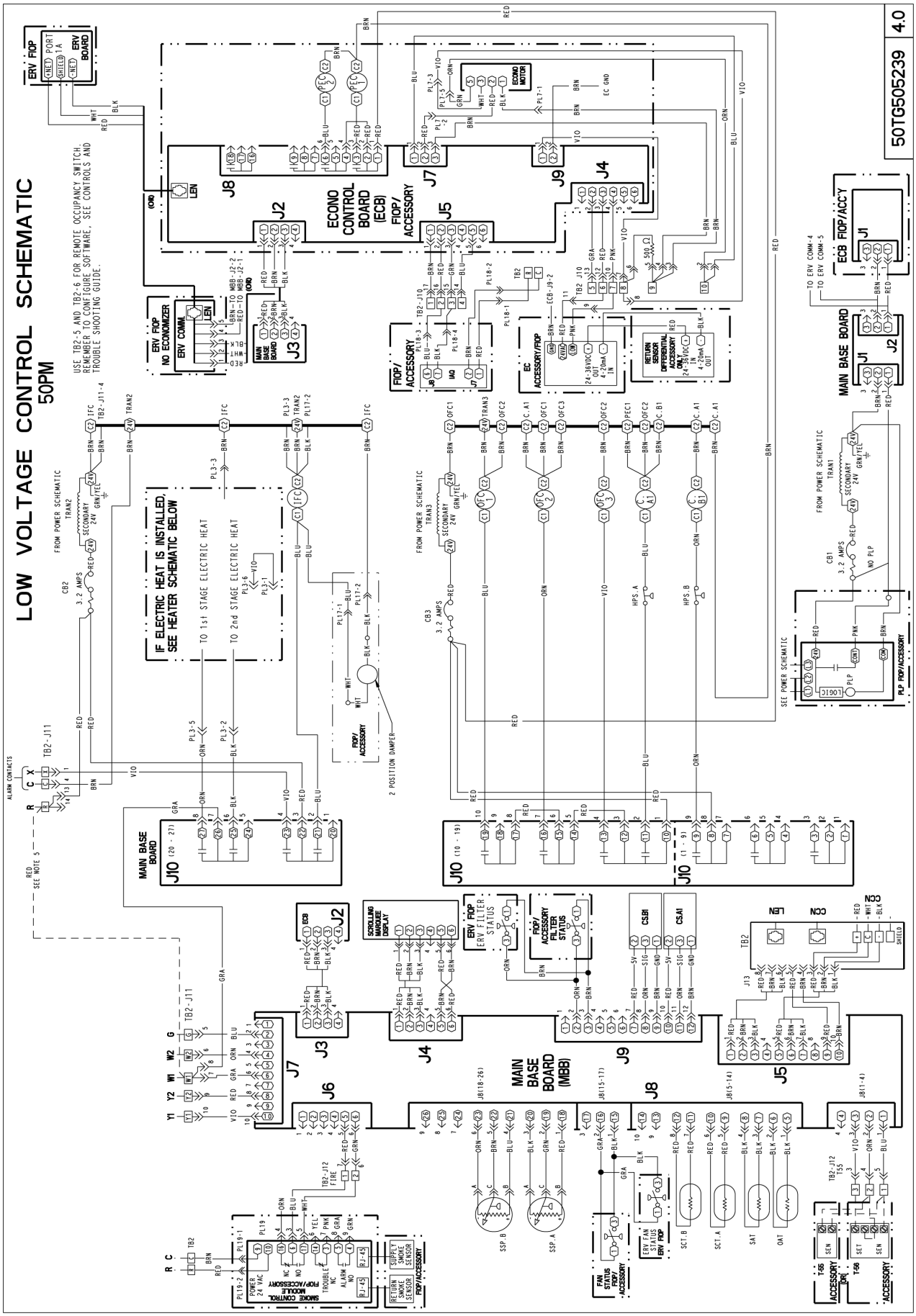
C08471

Fig. 31 – Typical 48PM16–28 Control Schematic



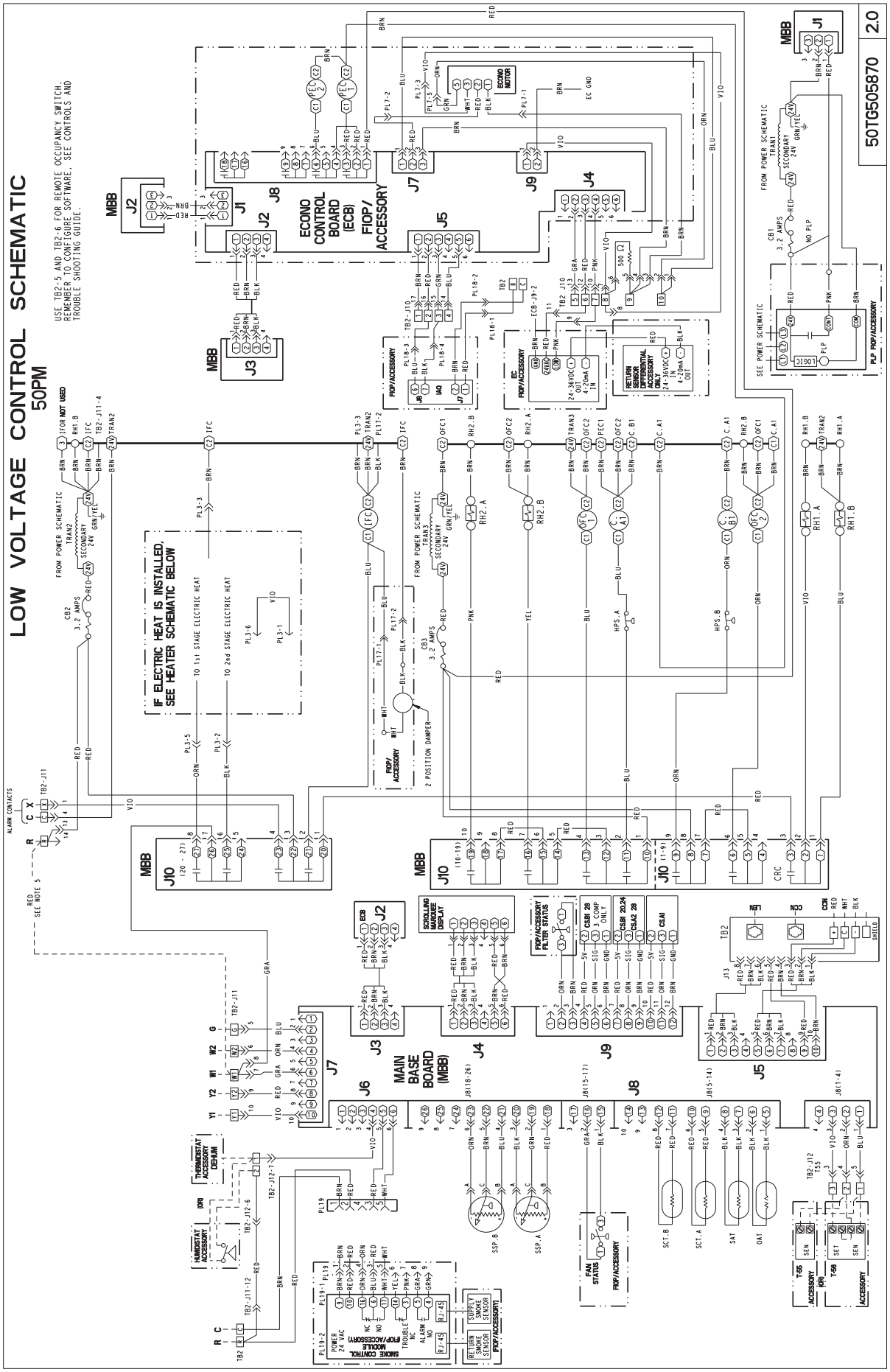
C08062

Fig. 32 – Typical 48PM16–28 with Humidi–MiZer™ System Control Schematic



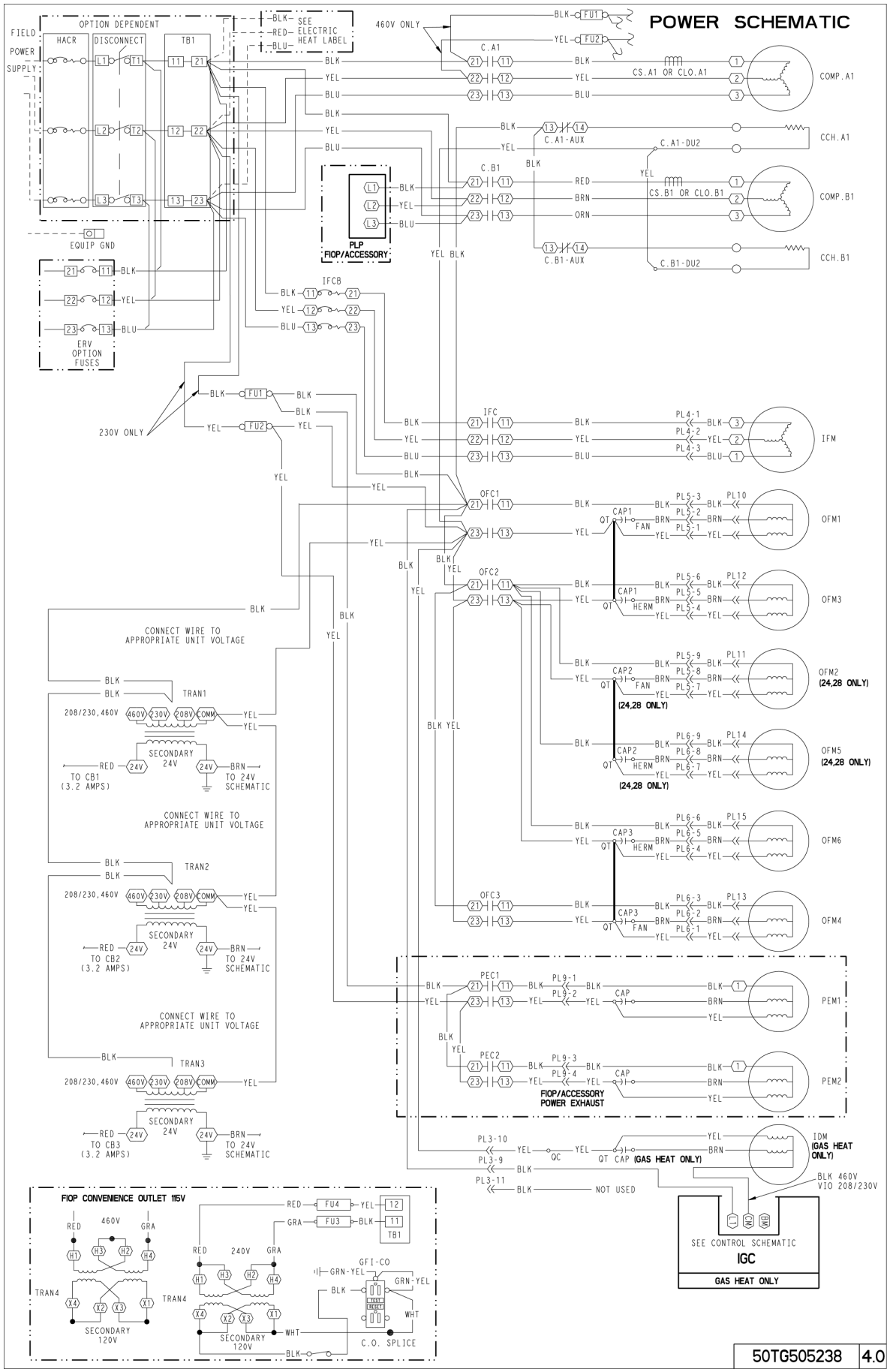
C101251

Fig. 33 – Typical 50PM16–28 Control Schematic



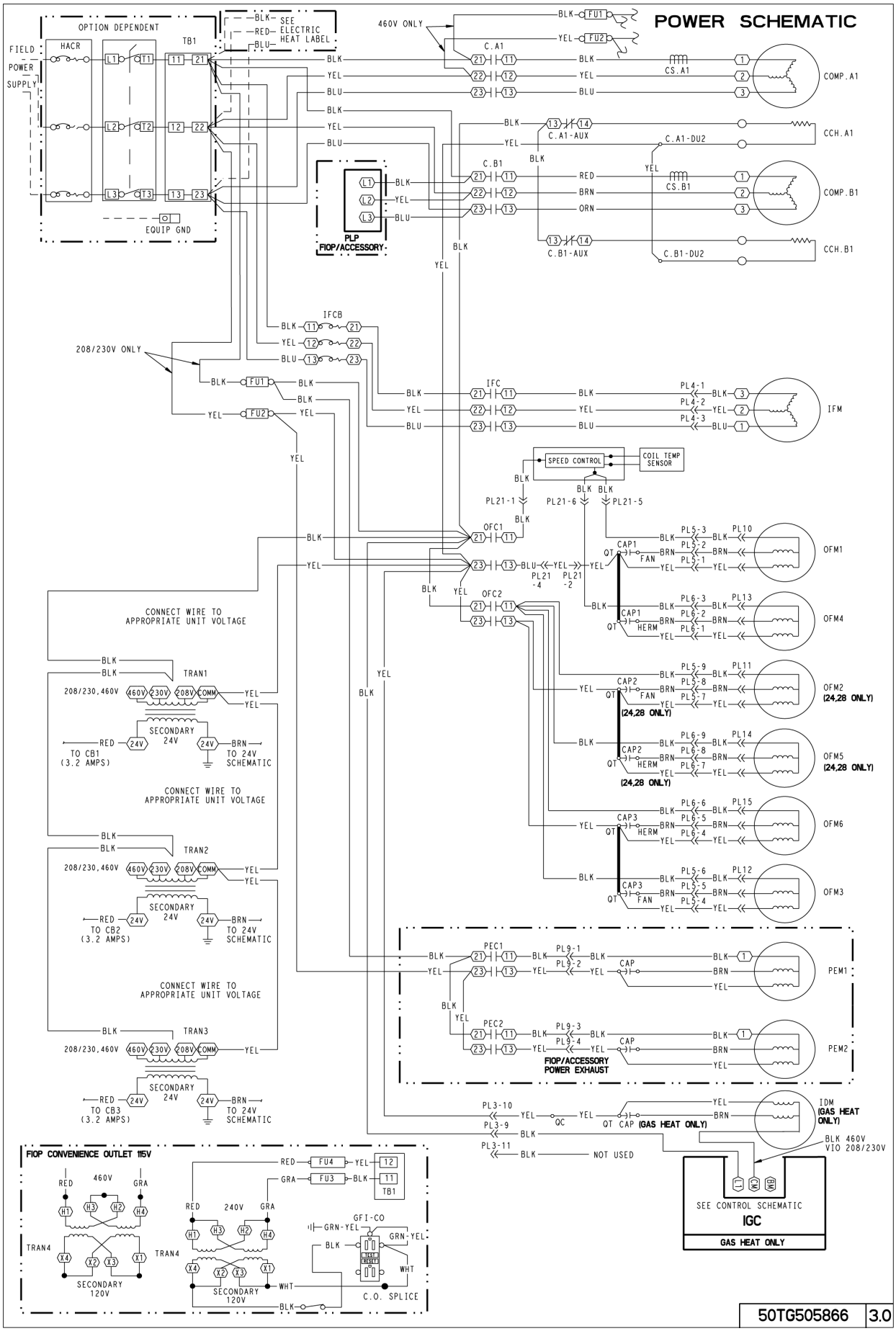
C08064

Fig. 34 – Typical 50PM16–28 with Humidi–MiZer™ Control Schematic



C10902

Fig. 35 – Typical 48/50PM16–28 Power Schematic



C09213

Fig. 36 – Typical 48/50PM16–28 with Humidi–MiZer™ System Power Schematic

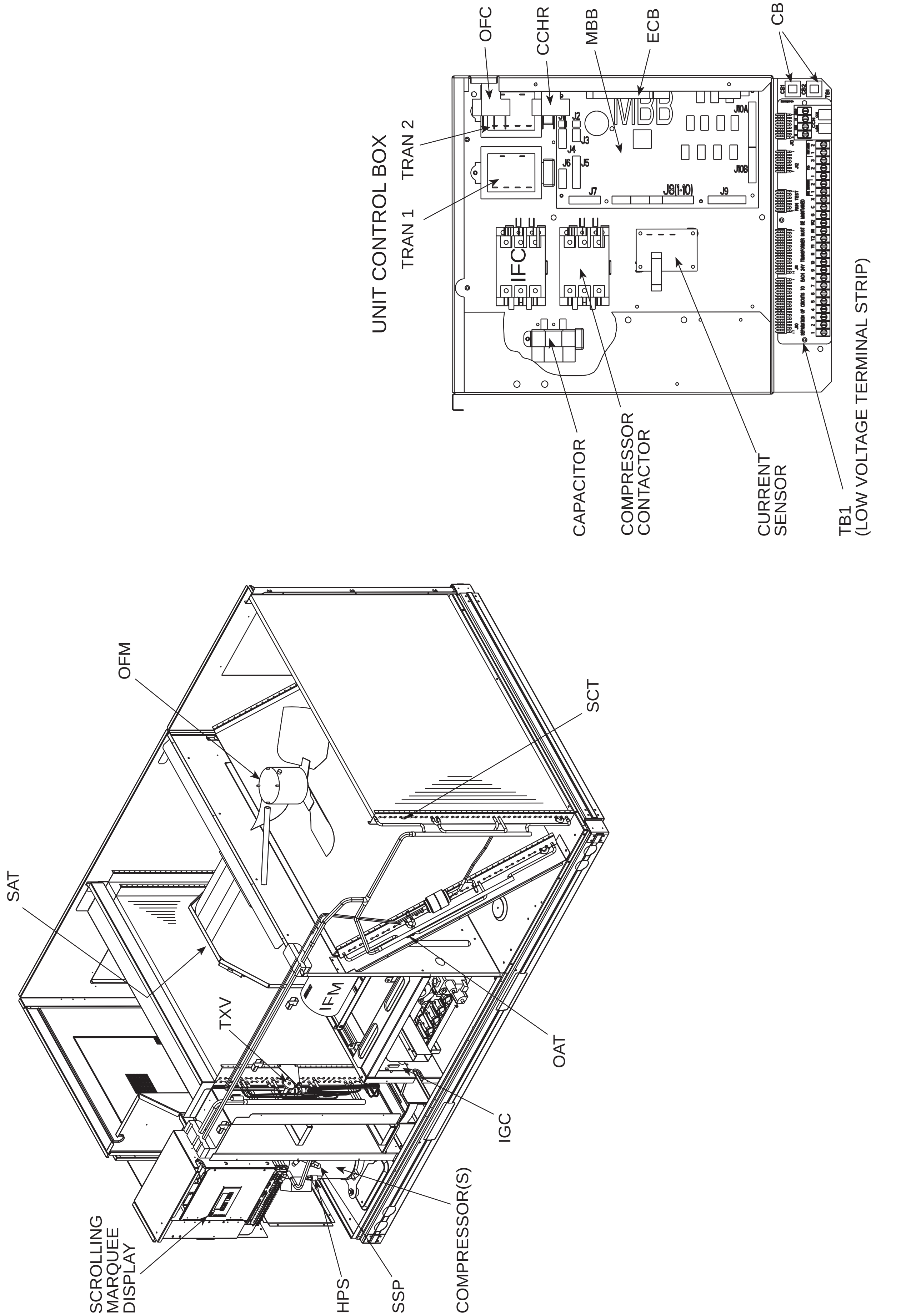
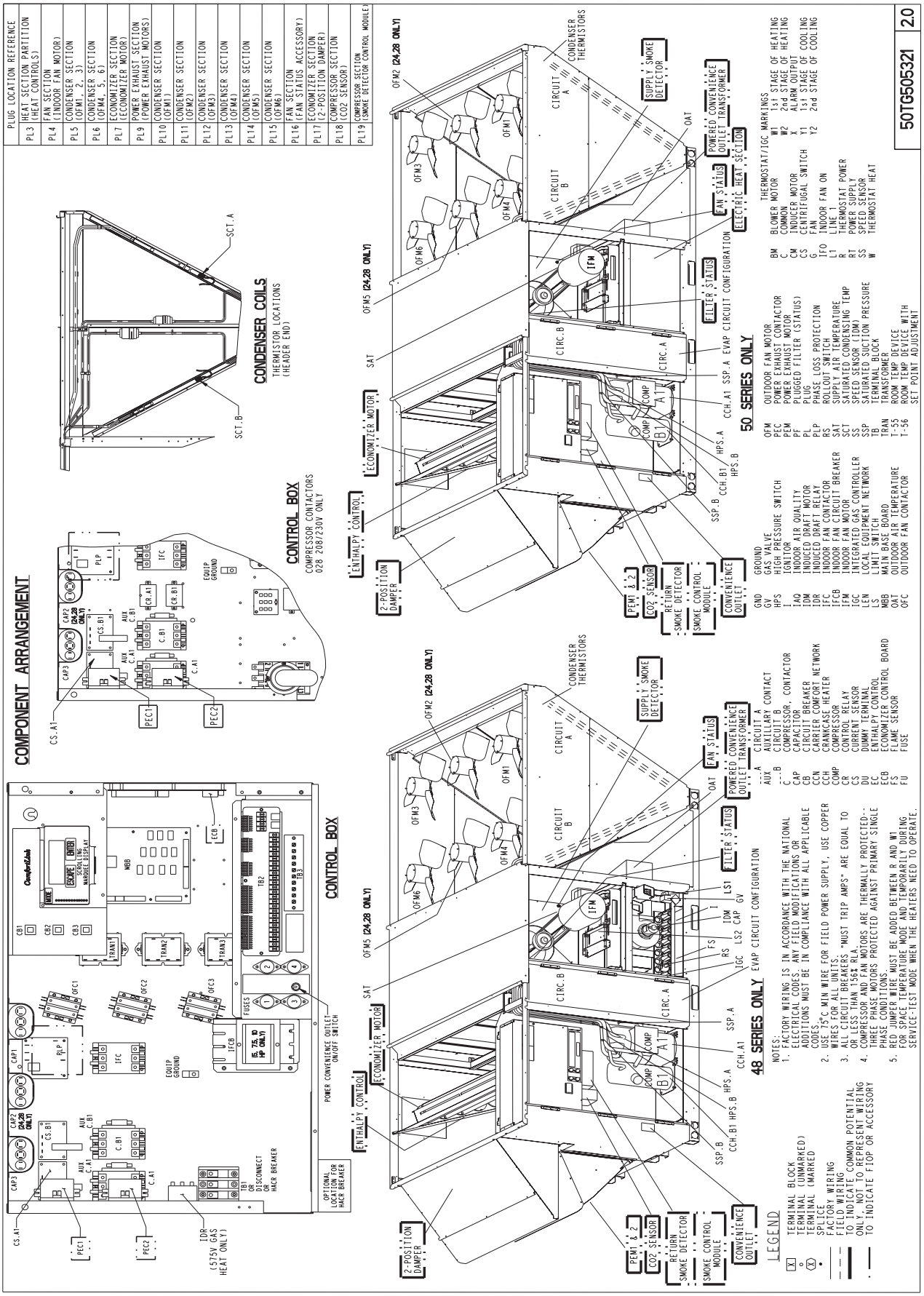
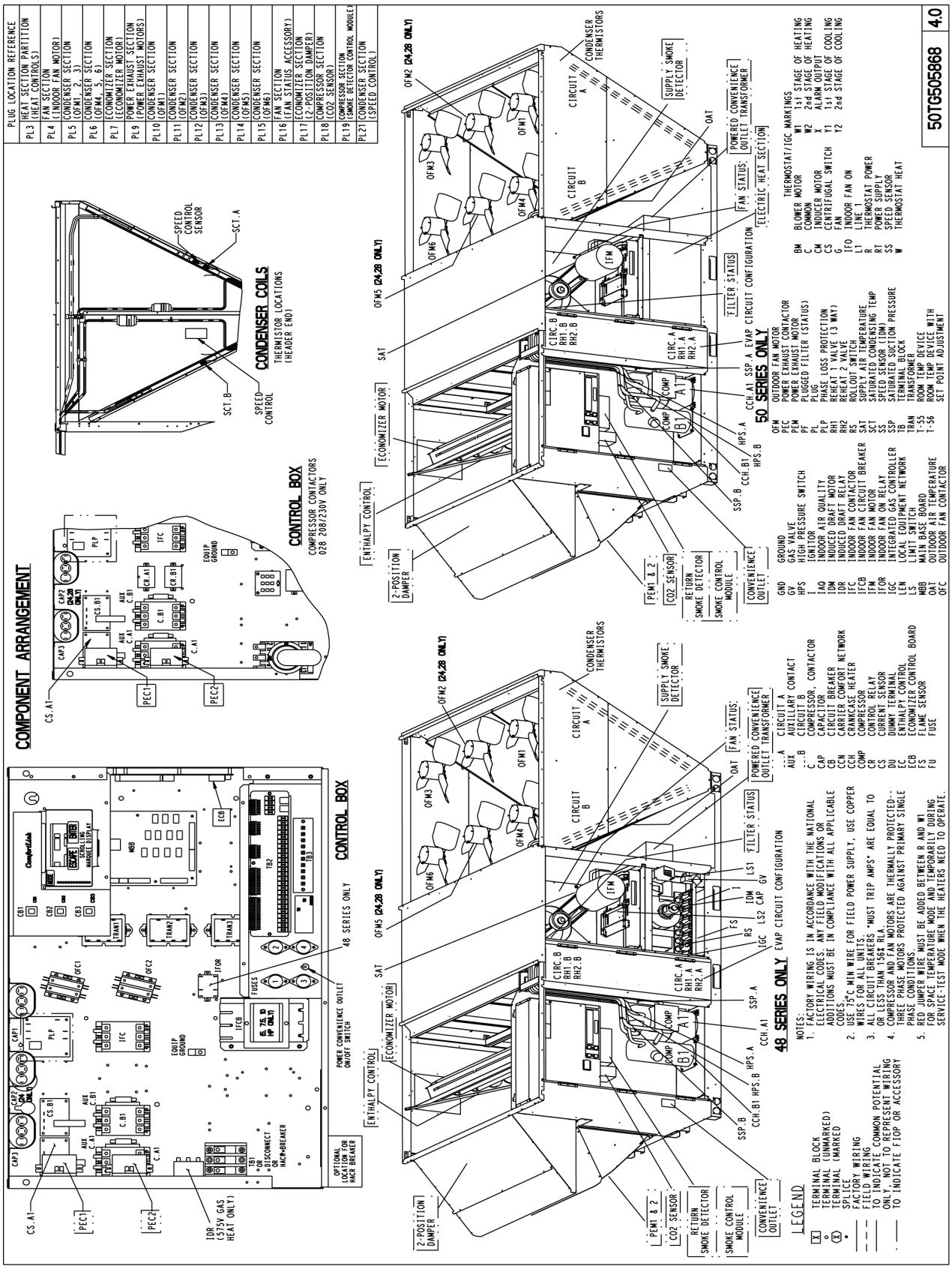


Fig. 37 − Typical 48/50PG03−16 Unit Component Arrangement (Sizes 03−07 Shown)



C08067

Fig. 38 – 48/50PM16–28 Component Arrangement



C101252

Fig. 39 – 48/50PM16–28 with Humidi–MiZer™ Component Arrangement

Main Base Board (MBB)

See Fig. 40 and Table 23. The MBB is the center of the *Comfort*Link™ control system. It contains the major portion of the operating software and controls the operation of the unit. The MBB continuously monitors input/output channel information received from its inputs and from the Economizer Control Board (ECB). The MBB receives inputs from thermistors and transducers. The MBB also receives the Current Sensor inputs for compressors and other discrete or digital inputs. The MBB reads space temperature (SPT) from either a T-55, T-56 or T-58 device and space temperature offset (SPTO) from a T-56 device. See Field-Installed Accessories section. The MBB controls 9 relays.

NOTE: The Main Base Board (MBB) has a 3-position instance jumper that is factory set to '1.' **Do not change this setting.**

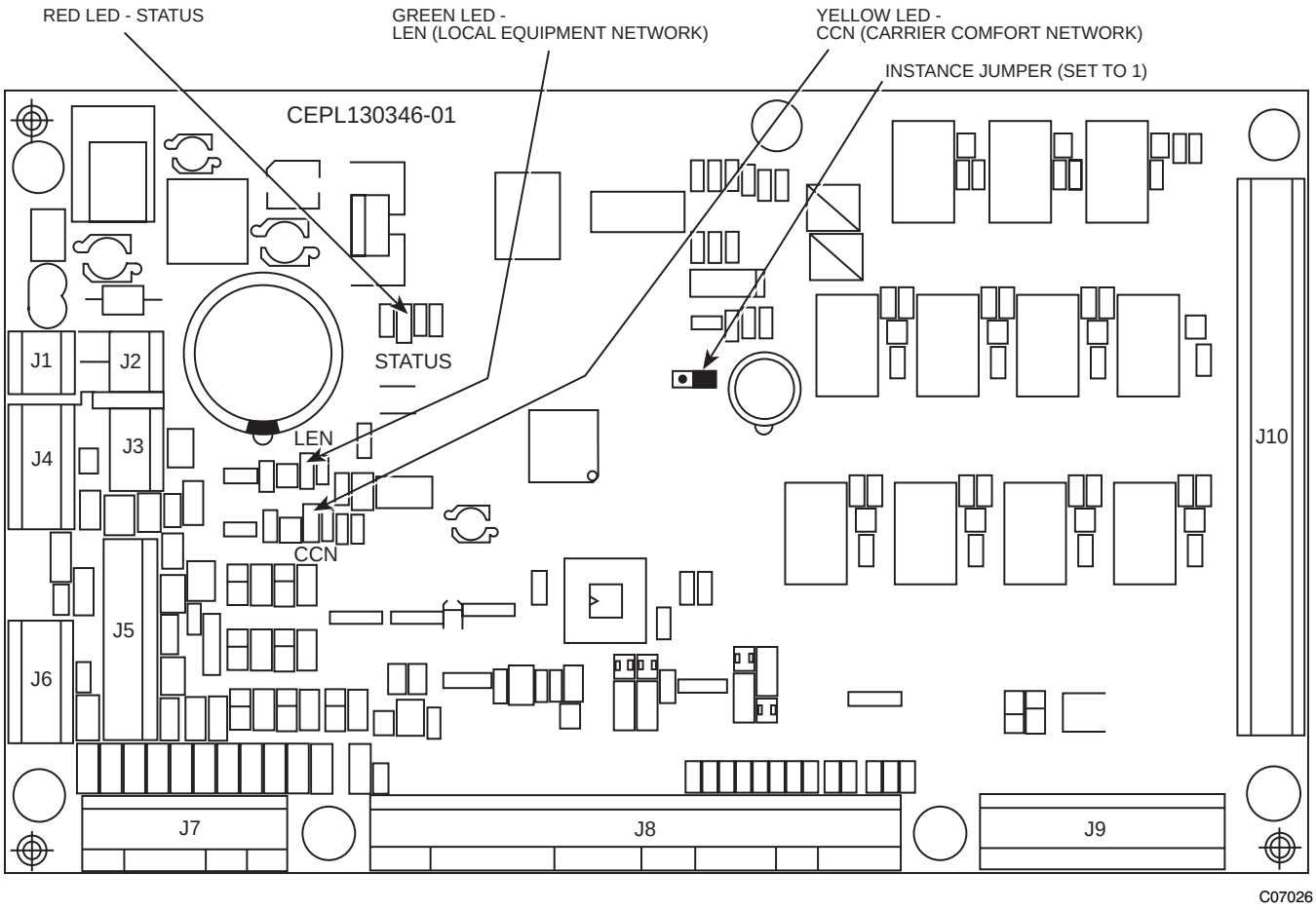


Fig. 40 – Main Base Board (MBB)

Table 23 – MBB Connections

DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
		INPUTS		
	Input power from TRAN1	control box	24 VAC	J1, 1—3
HUM	IGC Fan Request or Humidistat switch input	gas section / space	switch input	J6, 4
FDWN	Fire shutdown switch	supply/return/space	switch input	J6, 6
G	Thermostat G (Fan)	space	switch input	J7, 2
W2	Thermostat W2 (2nd Stage Heat)	space	switch input	J7, 4
W1	Thermostat W1 (1st Stage Heat)	space	switch input	J7, 6
Y2	Thermostat Y2 (2nd Stage Cool)	space	switch input	J7, 8
Y1	Thermostat Y1 (1st Stage Cool)	space	switch input	J7, 10
FIL.S	Filter status switch	indoor fan section	switch input	J9, 2—3
CS.A1	Compressor A1 Current Sensor	control box	0—5vdc digital input	J9, 4—6
CS.B1 or CS.A2	Compressor B1 or A2 Current Sensor	control box	0—5vdc digital input	J9, 7—9
CS.C1 or CS.B1	Compressor C1or B1 Current Sensor	control box	0—5vdc digital input	J9, 10—12
SPT	Space temperature (T55/56)	space	10k thermistor	J8, 1—2
SPTO or RAT	Space temperature offset (T56) or Return air temperature	space or return	10k thermistor	J8, 2—3
OAT	Outdoor air temperature	outdoor coil support	10k thermistor	J8, 5—6
SAT	Supply air temperature	indoor fan housing, or supply duct	10k thermistor	J8, 7—8
SCT.A	Saturated condenser temperature, circuit A	outdoor coil, circuit A	5k thermistor	J8, 9—10
SCT.B	Saturated condenser temperature, circuit B	outdoor coil, circuit B	5k thermistor	J8, 11—12
SCT.C	Saturated condenser temperature, circuit C	outdoor coil, circuit C	5k thermistor	J8, 13—14
FAN.S	Fan status switch	indoor fan section	switch input	J8, 15—16
SSP.A	Suction pressure, circuit A	compressor A suction	0—5 VDC pressure transducer	J8, 18—20
SSP.B	Suction pressure, circuit B	compressor B suction	0—5 VDC pressure transducer	J8, 21—23
SSP.C	Suction pressure, circuit C	compressor C suction	0—5 VDC pressure transducer	J8, 24—26
		OUTPUTS		
CRC	Cooling Reheat Control		relay	J10, 3
CMP.C or OFC.2	Compressor C1 relay or Outdoor fan 2 relay		relay	J10, 6
COMP.B	Compressor B1 relay		relay	J10, 9
COMP.A	Compressor A1 relay		relay	J10, 11
CCH or OFC.3 OFC.1	Crankcase heat relay or Outdoor fan 3 relay or Outdoor fan 1 relay		relay	J10, 13
OFC.2 or RH2.B	Outdoor fan 2 relay or Reheat 2 valve circuit B & C		relay	J10, 16
OFC.1 or RH2.A	Outdoor fan 1 relay or Reheat 2 valve circuit A		relay	J10, 19
IDF	Indoor fan relay		relay	J10, 21
ALRM	Alarm relay		relay	J10, 23
HT.1	Heat Stage 2 relay		relay	J10, 25
HT.2	Heat Stage 1 relay		relay	J10, 27
		COMMUNICATION		
	Local Equipment Network (LEN)		communication	J5, 1—3
	Carrier Comfort Network (CCN)		communication	J5, 5—7
	Network device power		24 VAC	J5, 9—10
	Scrolling Marquee Display (LEN)		communication	J4, 1—3
	Scrolling Marquee Display power		24 VAC	J4, 5—6
	Optional ECB (LEN)		communication	J3, 1—3
	Optional ECB power		24 VAC	J2, 1—2

Economizer Control Board (ECB)

The ECB controls the economizer actuator. (See Fig. 41 and Table 24.) The control signal from the ECB uses either the MFT (Multi-Function Technology) digital communication protocol or a 4 to 20 mA output signal as defined by the configuration ***Configuration→ECON→E.CTL***. The ECB has inputs for Indoor Air Quality (IAQ), Outdoor Air Quality (OAQ), enthalpy and RH sensor. It also controls two power exhaust outputs.

By digitally communicating with the ECB, the economizer actuator is able to provide the damper position and diagnostic information to the *Comfort*Link™ controller. The damper position is displayed at ***Outputs→ECON→EC.AP***. Diagnostic information is displayed via Alert T414. More information about these alarms is contained in the Alarms and Alerts section.

NOTE: The Economizer Control Board (ECB) has a 4-position DIP switch that is factory set to '0' (ON, towards the center of the board). **Do not change this setting.**

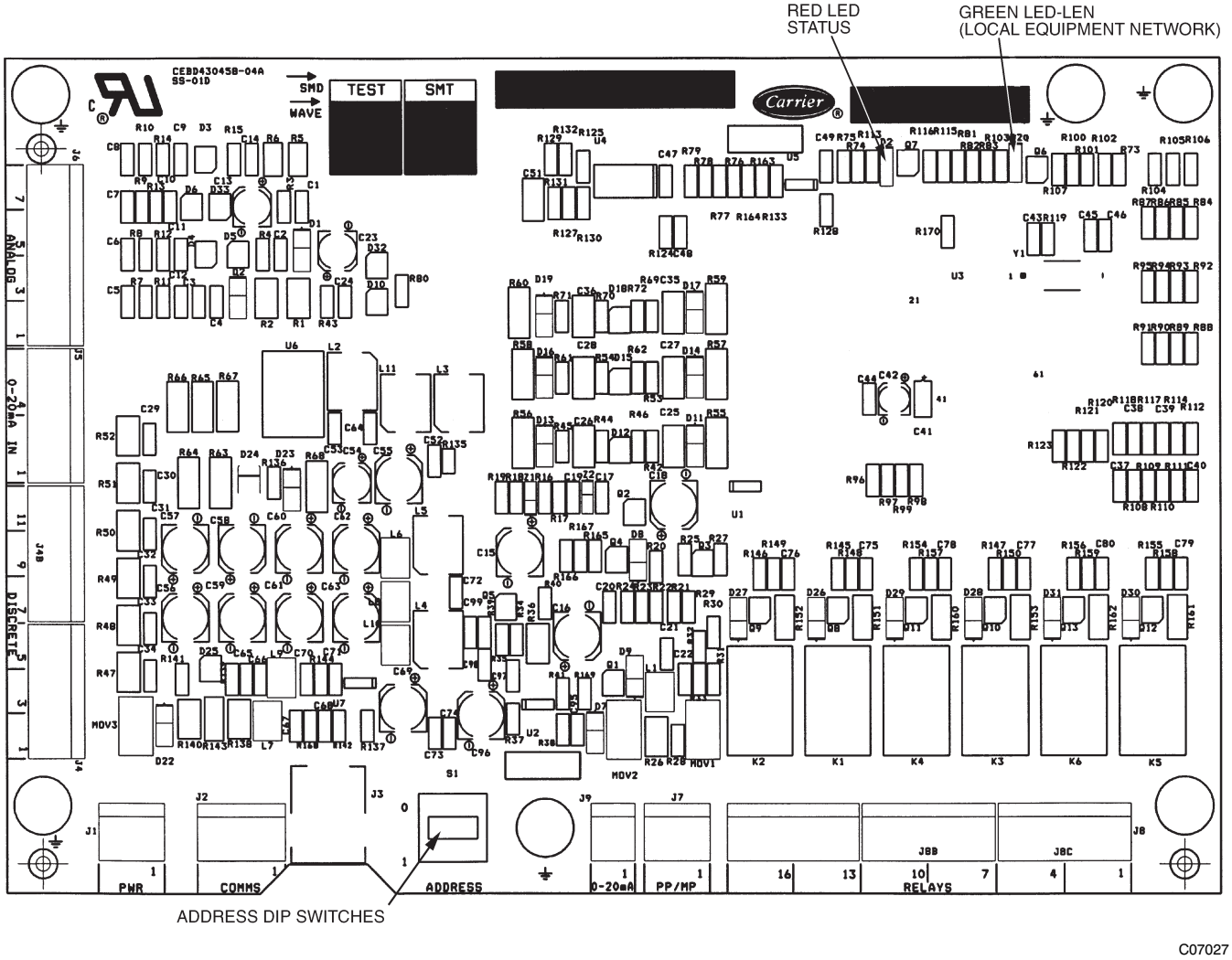


Fig. 41 – Economizer Control Board (ECB)

Table 24 – ECB Connections

DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
INPUTS				
	Input power from MBB	control box	24 VAC	J1, 1–2
RM.OC	Remote occupancy switch	field installed	switch input	J4, 2
ENTH or IAQ.S	Outdoor enthalpy switch, or Indoor air quality switch	economizer, or return/space	switch input	J4, 4
IAQ	Indoor air quality sensor	return/space	0–20 mA	J5, 2
OAQ or SP.RH	Outdoor air quality sensor, or Relative humidity sensor	field installed	0–20 mA	J5, 5
	Sensor Common		Ground	J5, 3
	Actuator Common		Ground	J7, 3
OUTPUTS				
	Output power to enthalpy switch		24 VAC	J4, 3
	Output power for loop power sensors		24 VDC	J5, 1
	Output power to economizer actuator		24 VAC	J7, 2
PE.1	Power exhaust 1 relay		relay	J8, 3
PE.2	Power exhaust 2 relay		relay	J8, 6
EC.CP or F.SPD	Commanded Economizer position or Commanded Fan Speed		0–20 mA	J9, 1
COMMUNICATION				
	Local Equipment Network (LEN)		communication	J2, 1–3
	Carrier Comfort Network (CCN)		communication	J3
EC.CP & EC.AP	Economizer actuator position (digital control)		MFT communication	J7, 1

Integrated Gas Control (IGC) Board

The IGC is provided on gas heat units. (See Fig. 42 and Table 25.) The IGC controls the direct spark ignition system and monitors the rollout switch, limit switch, and induced-draft motor Hall Effect switch.

The IGC is equipped with an LED (light-emitting diode) for diagnostics. See the Troubleshooting section for more information.

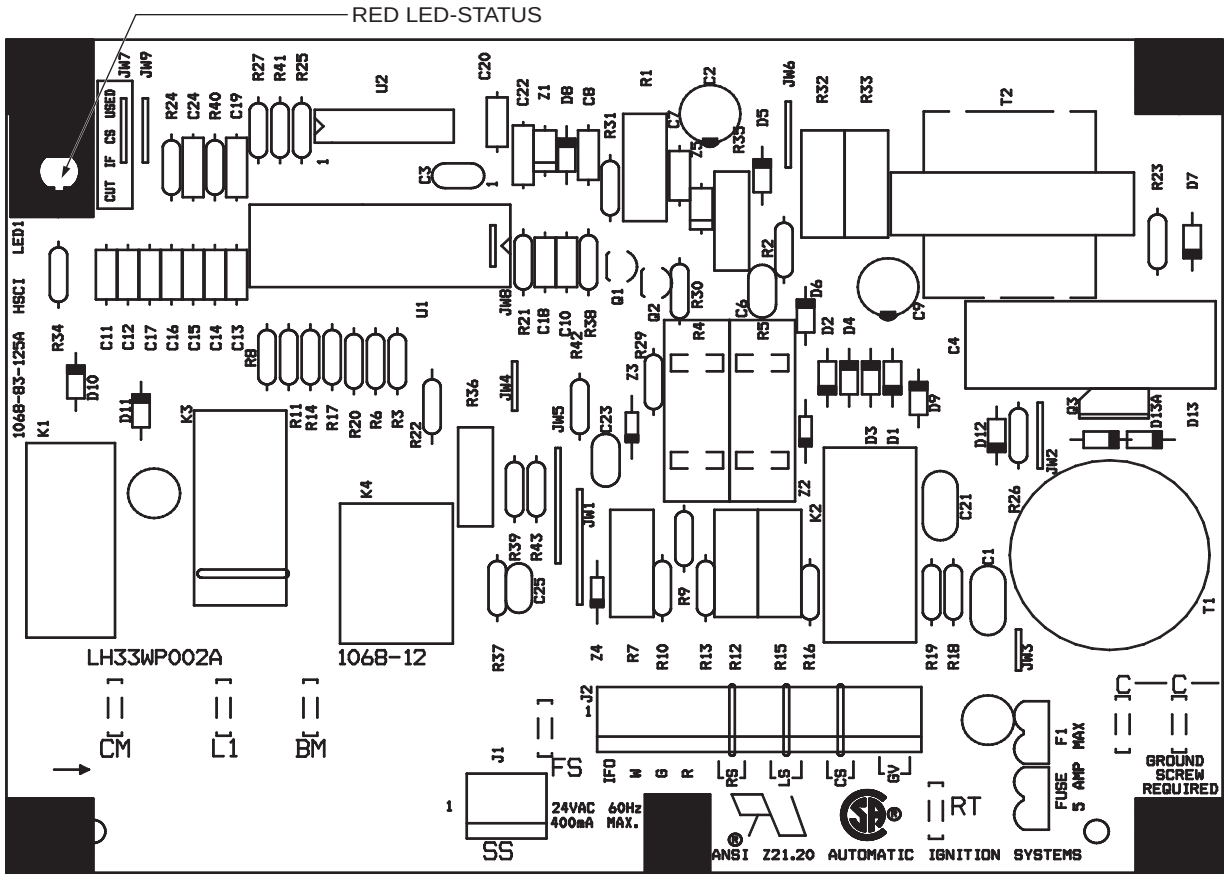


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Fig. 42 – Integrated Gas Control (IGC) Board

Table 25 – IGC Connections

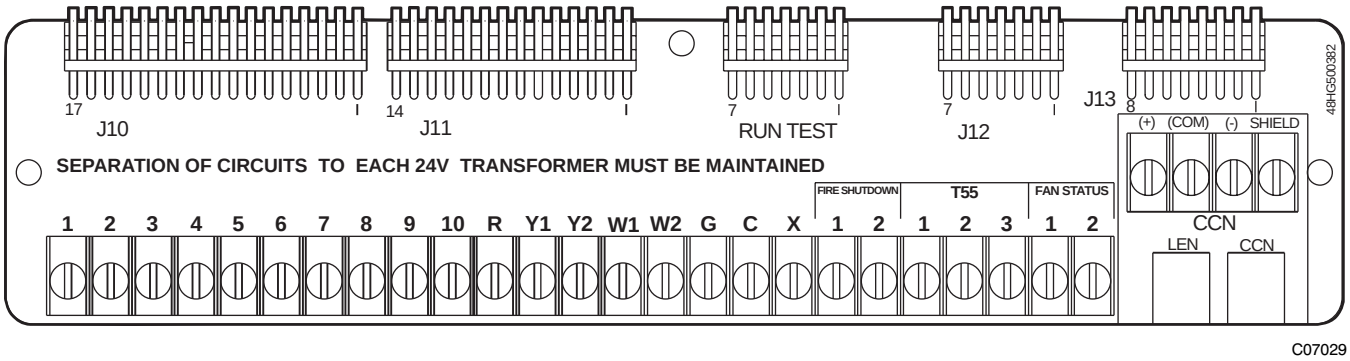
TERMINAL LABEL	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
INPUTS				
RT, C	Input power from TRAN 1	control box	24 VAC	
SS	Speed sensor	gas section	analog input	J1, 1–3
FS, T1	Flame sensor	gas section	switch input	
W	Heat stage 1	MBB	24 VAC	J2, 2
RS	Rollout switch	gas section	switch input	J2, 5–6
LS	Limit switch	gas section	switch input	J2, 7–8
CS	Centrifugal switch (not used)		switch input	J2, 9–10
OUTPUTS				
L1, CM	Induced draft combustion motor	gas section	line VAC	
IFO	Indoor fan request	control box	relay	J2, 1
GV (W1)	Gas valve (heat stage 1)	gas section	relay	J2, 12
GV (W2)	Gas Valve (heat stage 2, from MBB)	gas section	Not on IGC	

Low Voltage Terminal Strip

(TB1 on PG03−16 size and TB2 on PG20−28 and PM16−28 size units)

This circuit board provides a connection point between the major control boards and a majority of the field-installed accessories. (See Fig. 43 and Table 26.)

The circuit breakers for the low voltage control transformers, interface connection for the Carrier Comfort Network® (CCN) communication, and interface connection for the Local Equipment Network (LEN) communications are also located on the low voltage terminal strip.



C07029

Fig. 43 – Low−Voltage Terminal Strip

Table 26 – Field Connection Terminal Strip

TERMINAL LABEL	DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
1		24 VDC Sensor Loop power		24 VDC output	J10, 17
2	IAQ	Indoor air quality sensor	return/space	4−20 mA input	J10, 16
3		Air quality & humidity sensor common		Ground	J10, 15
4	OAQ or SP.RH	Outdoor air quality sensor or Relative humidity sensor	field installed	4−20 mA input	J10, 14
5	RM.OC	Remote occupancy switch	field installed	24 VAC input	J10, 13
6		Switch power (ENTH, RM.OC, IAQ.S)		24 VAC output	J10, 11−12
7	ENTH or IAQ.S	Outdoor enthalpy switch, or Indoor air quality switch	economizer, or return/space	24 VAC input	J10, 9−10
8*	EC.CP	Economizer commanded position actuator (when in digital control)	economizer	2−10 VDC output	J10, 6−8
9		Economizer signal common		Ground	J10, 3−5
10*	EC.AP	Economizer position feedback (when in analog control)	economizer	communication 2−10 VDC output	J10, 1−2
R		24 VAC power		24 VAC output	J11, 11−14
Y1	Y1	Thermostat Y1 (1st stage cool)	space	24 VAC input	J11,10
Y2	Y2	Thermostat Y2 (2nd stage cool)	space	24 VAC input	J11, 9
W1	W1	Thermostat W1 (1st stage heat)	space	24 VAC input	J11, 7−8
W2	W2	Thermostat W2 (2nd stage heat)	space	24 VAC input	J11, 6
G	G	Thermostat G (Fan)	space	24 VAC input	J11, 5
C		24 VAC common		24 VAC output	J11, 2−4
X	ALRM	Alarm output (normally open)		24 VAC output	J11, 1
FIRE SHUTDOWN or HUMIDISTAT 1*	FDWN or HUM	Fire shutdown switch 24 VAC output or Humidistat switch input	supply/return/ space	switch input	J12, 7
FIRE SHUTDOWN or HUMIDISTAT 2*	FDWN or HUM	Fire shutdown switch input or Humidistat switch 24 VAC output	supply/return/ space	switch input	J12, 6
T55 1−2	SPT	Space temperature (T55/56)	space	10k thermistor	J12, 4−5
T55 2−3	SPTO or RAT	Space temperature offset (T56) or Return air temperature	space or return	10k thermistor	J12, 3−4
FAN STATUS 1−2		NOT USED			J12, 1−2
LEN		Local Equipment Network (LEN)		communication	J13, 6−8, 4−5
CCN		Carrier Comfort Network (CCN)		communication	J13, 1−3, 4−5

* Refer to Third Party Control section for more information

Scrolling Marquee Display

This device is the keypad interface used to access rooftop information, read sensor values, and test the unit. (See Fig. 44.) The Scrolling Marquee display is a 4-key, 4-character, 16-segment LED (light-emitting diode) display. Eleven mode LEDs are located on the display as well as an Alarm Status LED. See Basic Control Usage section for further details.

Accessory Navigator™ Display

The accessory hand-held Navigator display can be used with 48/50PG and PM units. (See Fig. 45.) The Navigator display operates the same way as the Scrolling Marquee device. The Navigator display plugs into the LEN port on either TB or the ECB board.

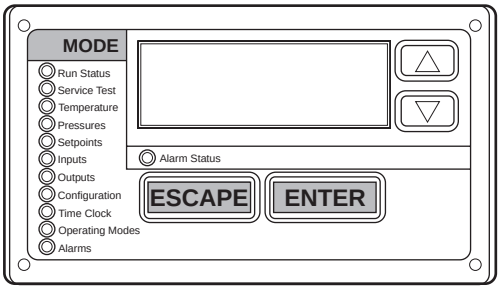


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Fig. 44 – Scrolling Marquee

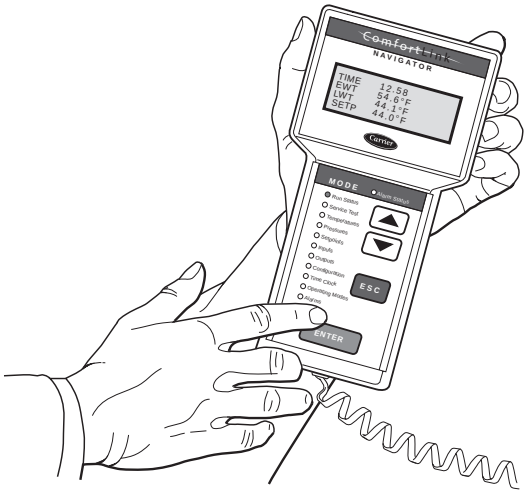

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Fig. 45 – Accessory Navigator™ Display

Carrier Comfort Network (CCN)® Interface

The units can be connected to the CCN if desired. The communication bus wiring is a shielded, 3-conductor cable with drain wire and is field supplied and installed. The system elements are connected to the communication bus in a daisy chain arrangement. (See Fig. 46.) The positive pin of each system element communication connector must be wired to the positive pins of the system elements on either side of it. This is also required for the negative and signal ground pins of each system element. Wiring connections for CCN should be made at TB. (See Fig. 18.) Consult the CCN Contractor's Manual for further information.

NOTE: Conductors and drain wire must be 20 AWG (American Wire Gauge) minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –20°C to 60°C is required. See Table below for acceptable wiring.

MANUFACTURER	PART NO.
Alpha	2413 or 5463
Belden	8772
Carol	C2528
West Penn	302

It is important when connecting to a CCN communication bus that a color-coding scheme be used for the entire network to simplify the installation. It is recommended that red be used for the signal positive, black for the signal negative and white for the signal ground. Use a similar scheme for cables containing different colored wires.

At each system element, the shields of its communication bus cables must be tied together. The shield screw on TB1 can be used to tie the cables together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground at one point only. The shield screw on TB1 is not acceptable for grounding. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only). To connect the unit to the network:

1. Turn off power to the control box.
2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (–) conductors. (Substitute appropriate colors for different colored cables.)
3. Connect the red wire to (+) terminal on TB1, the white wire to COM terminal, and the black wire to the (–) terminal.
4. The RJ14 CCN connector on TB1 can also be used, but is only intended for temporary connection (for example, a laptop computer running Carrier network software).
5. Restore power to unit.

IMPORTANT: A shorted CCN bus cable will prevent some routines from running and may prevent the unit from starting. If abnormal conditions occur, unplug the connector. If conditions return to normal, check the CCN connector and cable. Run new cable if necessary. A short in one section of the bus can cause problems with all system elements on the bus.

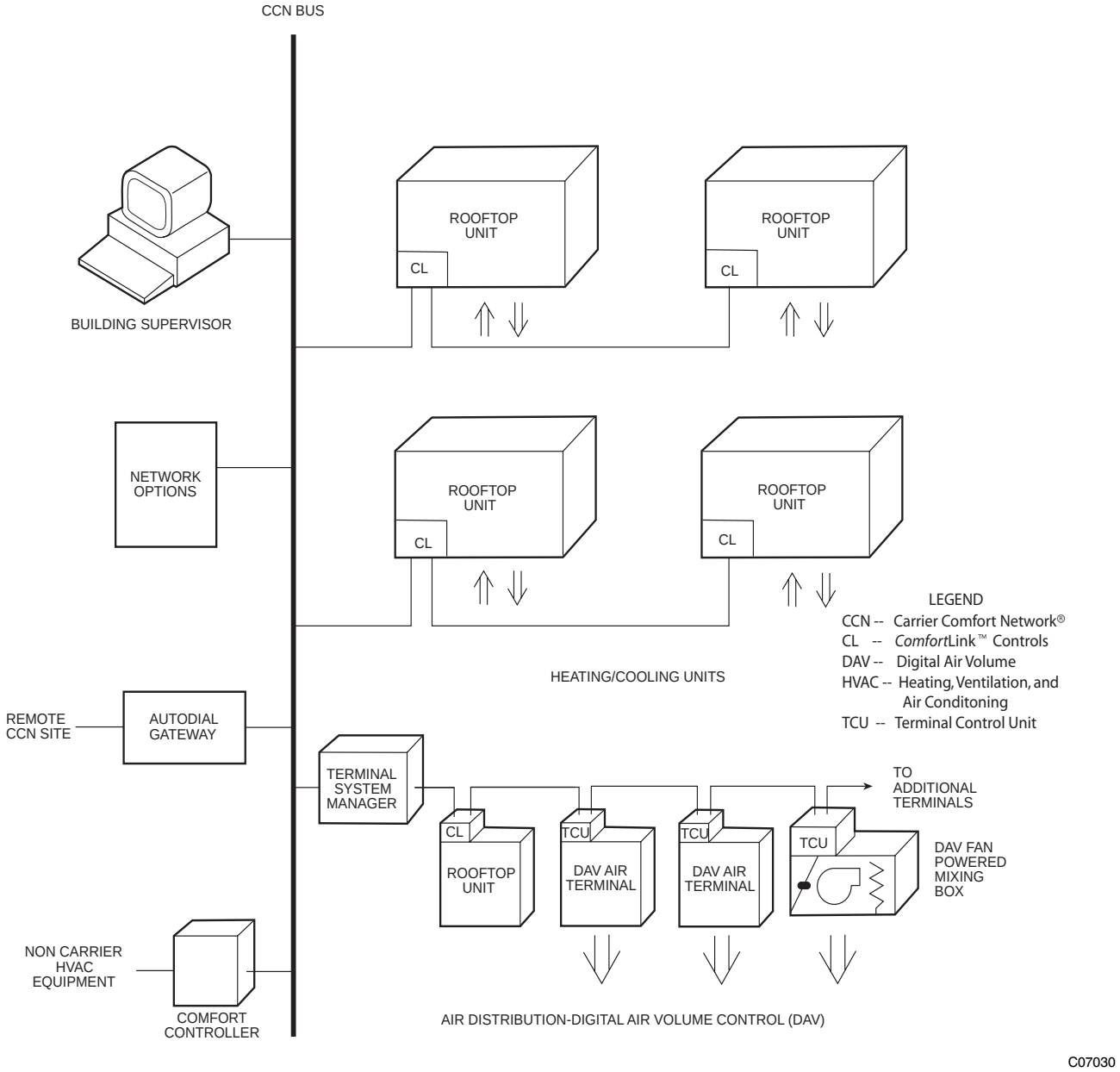


Fig. 46 – CCN System Architecture

EnergyX

Units equipped with Optional EnergyX have a factory installed energy recovery ventilator (ERV). The ERV is used to pre−condition outside air as it is brought into the rooftop unit. To do this it uses building air and an enthalpy wheel. It can also have a wheel bypass that acts as an economizer to allow free cooling. In Appendix A there are ERV points for display under Outside Air Unit (OAU) menus. These points and ERV specifics are explained in the EnergyXv2 Supplement Installation Instructions contained in the unit's information packet.

Field-Installed Accessories

Space Temperature Sensor (T−55)

The T-55 space temperature sensor (part no. 33ZCT55SPT) is a field-installed accessory. The sensor is installed on a building interior wall to measure room air temperature. The T-55 sensor also includes an override button on the front cover to permit occupants to override the Unoccupied Schedule (if programmed). The jumper wire in the installer's packet must be connected between R and W1 when using a T-55 device.

TB−T55−1 . . . . . Sensor Input

TB−T55−2 . . . . . Sensor Common

Space Temperature Sensor (T−56)

The T-56 space temperature sensor (part no. 33ZCT56SPT) is a field-installed accessory. This sensor includes a sliding scale on the front cover that permits an occupant to adjust the space temperature set point remotely. The T-56 sensor also includes an override button on the front cover to allow occupants to override the unoccupied schedule (if programmed). The jumper wire in the installer's packet must be connected between R and W1 when using a T-56 device.

TB−T55−1 . . . . . Sensor Input

TB−T55−2 . . . . . Sensor Common

TB−T55−3 . . . . . Setpoint Offset Input

Space Temperature Sensor (T−58)

The T-58 space temperature sensor (part no. 33ZCT58SPT) is a field-installed accessory. The T-58 sensor communicates with the *Comfort*Link™ controller, providing space temperature, heating and cooling set points, and mode operation information. The jumper wire in the installer's packet must be connected between R and W1 when using a T-58 device.

Refer to the T-58 installation instructions for information on installing and configuring the T-58 sensor.

Each T-58 sensor must have a unique address on the CCN. Each T-58 sensor must also be configured with the address of the unit control it is communicating to.

Space Temperature Sensor Averaging

See Fig. 47 for space temperature averaging with T-55 sensors only. If the use of one T-56 sensor is required, refer to Fig. 48.

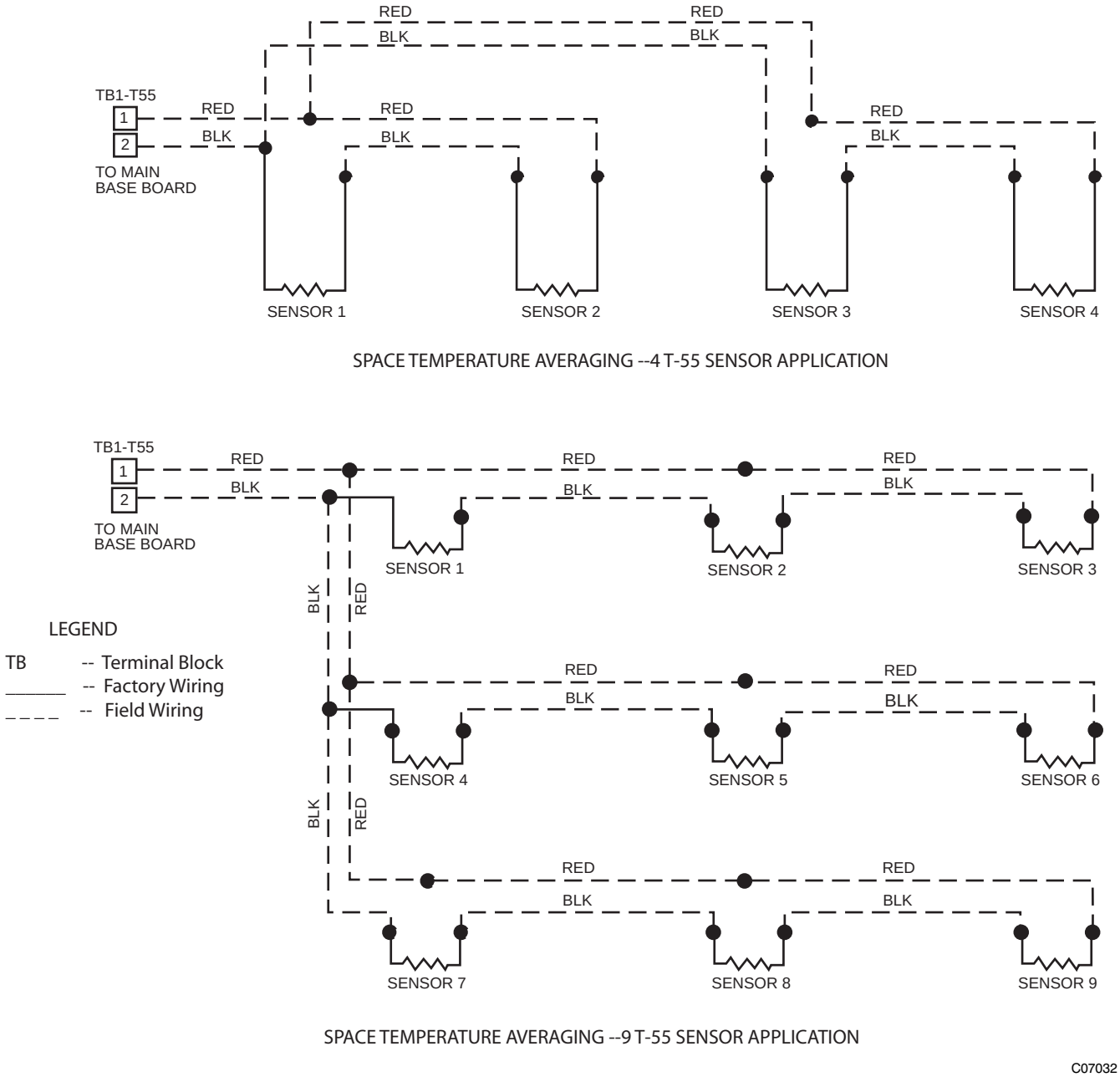


Fig. 47 – Space Temperature Sensor Averaging

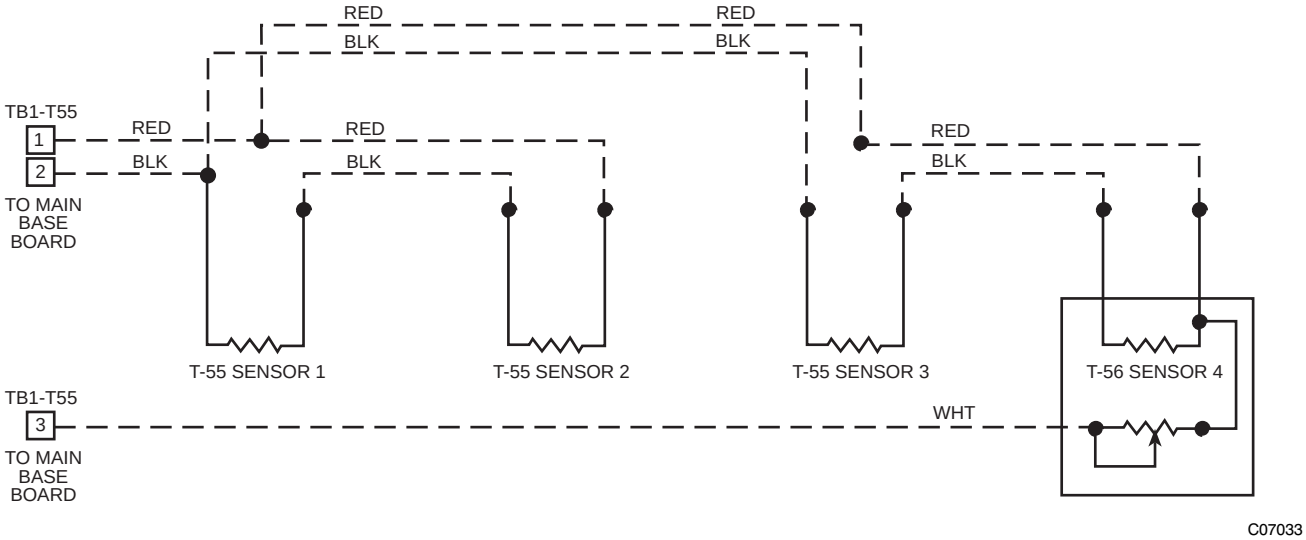


Fig. 48 – Space Temperature Sensor Averaging with 3 T–55 Sensors and One T–56 Sensor

Carrier Accessory Kits

There are specific accessory kits sold for various field installed accessories. These kits vary based on model, size, voltage, manufacture date, and duct orientation. Some of these kits include Economizer, Power Exhaust, and Electric Heat. Refer to the Controls Quick Set−Up section for configuration and more information on these accessories.

Two−Position Damper

The two-position outdoor air damper accessory usage depends on model size and return duct orientation. This accessory wires directly into the low voltage circuit for the indoor fan control. No other control configuration is needed.

Indoor Air Quality

The indoor air quality (IAQ) sensor (part no. 33ZCSENCO2) is a field-installed accessory which measures CO_2 levels in the air. When installing this sensor, an ECB board must be installed and the unit must be configured for IAQ use by setting ***Configuration→AIR.Q→IA.CF*** to a value of 1, 2, or 3. See the Indoor Air Quality section for more information.

TB−2 . . . . . 4−20mA Input

TB−3 . . . . . Sensor Common

TB−R . . . . . 24vac Output

TB−C . . . . . Common (GND)

Outdoor Air Quality

The outdoor air quality (OAQ) sensor is a field-installed accessory that measures CO_2 levels in the air. When installing this sensor, an ECB board must be installed and the unit must be configured for OAQ use by setting ***Configuration→AIR.Q→OA.CF*** to a value of 1 or 2. See the Indoor Air Quality section for more information.

TB−2 . . . . . 4−20mA Input

TB−3 . . . . . Sensor Common

TB−R . . . . . 24vac Output

TB−C . . . . . Common (GND)

Smoke Detectors

The smoke detectors are field-installed accessories. These detectors can detect smoke in either the return air (part no. CRSMKDET003A00) or supply and return air (part no. CRSMKSUP002A00). When installing either detector, the unit must be configured for fire shutdown by setting ***Configuration→UNIT→FS.SW*** to normally open (1) or normally closed (2).

TB−Fire Shutdown−1 . . . . . Dry Contact Source

TB−Fire Shutdown−2 . . . . . Discrete Input to Board

TB−R . . . . . 24vac Output

TB−C . . . . . Common (GND)

NOTE: When a Humidi-Mizer™ system is installed, the inputs to the fire shutdown are moved to the control harness. See the Third Party Control section for more information.

Filter Status

The filter status accessory (part no. CRSTATUS002B00) is a field-installed accessory. This accessory detects plugged filters. When installing this accessory, the unit must be configured for filter status by setting ***Configuration→UNIT→FL.SW*** to normally open (1) or normally closed (2). Normally open (1) is the preferred configuration.

Filter status wires are pre−run in the unit harness and located near the switch installation location. Refer to the Filter Accessory installation instructions for more information.

Fan Status

The fan status accessory (part no. CRSTATUS003B00) is a field-installed accessory. This accessory detects when the indoor fan is blowing air. When installing this accessory, the unit must be configured for fan status by setting ***Configuration→UNIT→FN.SW*** to normally open (1) or normally closed (2). Normally open (1) is the preferred configuration.

Fan status wires are pre−run in the unit harness and located near the switch installation location. Refer to the Fan Accessory installation instructions for more information.

NOTE: The fan status terminals on TB1 are NOT to be used.

Enthalpy Sensors

The enthalpy accessories (part no. CRENTSNG002A00 and CRENTDIF002A00) are field-installed accessories. The first accessory (outdoor air only) determines when the enthalpy is low relative to a fixed reference. Adding the second accessory (return air) compares the enthalpy between the outdoor and return airstreams. In each case, the enthalpy 4 to 20 mA signals are converted to a switch output which is read by the ECB. When installing this accessory, the unit must be configured for enthalpy-based control by setting ***Configuration→ECON→EN.SW*** to normally open (1). See Fig. 26 and 27 for wiring details.

Normal status is an active switch which tells the control that enthalpy is LOW. The actual switch terminal LOW is normally closed. Refer to the Enthalpy Kit installation instructions for more information on the installation.

Return/Supply Air Temperature Sensor

The temperature sensor (part no. 33ZCSENSAT) is a field-installed accessory which may be installed on the common return air duct and/or the common supply air duct near the unit. The duct return air temperature (RAT) may be selected for display only if the space temperature offset (SPTO) is not used. When installing the sensor, the unit must be configured by setting ***Configuration→UNIT→RAT.S*** to YES. Using a RAT will allow differential dry bulb control of the economizer. The duct supply air temperature (SAT) may be used to replace the SAT sensor that is internal to the unit. A supply duct SAT measurement is valid for heating mode display while the factory-standard internal SAT is not valid for heating due to its location upstream of the heating section. When installing the supply duct SAT, the unit must be configured by setting ***Configuration→UNIT→SAT.H*** to ENBL. A SAT sensor in the supply duct is the preferred configuration for systems with Carrier variable volume and temperature (VVT®) accessory controls.

Space Humidistat

The Space Humidistat (part no. −−HL−−38MG−029) is a wall mounted device with an adjustable setpoint to control humidity levels. The humidistat input is provided on the field connection terminal board. The Space Humidity Switch configuration, ***Configuration→UNIT→RH.SW***, identifies the normally open or normally closed status of this input at LOW humidity.

TB−HUMIDISTAT1 . . . . . Discrete Input to Board

TB−HUMIDISTAT2 . . . . . 24 VAC Dry Contact Source

NOTE: The humidistat terminals are only in use when the unit is equipped with the Humidi−MiZer factory option.

Space Humidity Sensor

The space relative humidity sensor (part no. 33ZCSENDRH−01 duct mount or 33ZCSENSRH−01 wall mount) is a field−installed accessory. The space relative humidity (RHS) may be selected for use if the outdoor air quality sensor (OAQ) is not used and an economizer board is installed. When installing the relative humidity sensor, the unit must be configured by setting ***Configuration→UNIT→RH.S*** to YES.

TB−1 . . . . . 24 VDC Loop Power

TB−4 . . . . . 4−20mA Input Signal

SERVICE

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lockout tag. Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

Puron® (R−410A) refrigerant systems operate at higher pressures than standard R−22 systems. Do not use R−22 service equipment or components on Puron refrigerant equipment.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
2. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

What to do if you smell gas:

1. DO NOT try to light any appliance.
2. DO NOT touch any electrical switch, or use any phone in your building.
3. IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury or death.

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by closing the manual gas valve(s).

Cleaning

Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

Coil Maintenance and Cleaning Recommendation

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

Remove Surface Loaded Fibers

Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges can be easily bent over and damage to the coating of a protected coil) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended.

Routine Cleaning of NOVATION Heat Exchanger Coil Surfaces

To clean the NOVATION Heat Exchanger condenser coil, chemicals are NOT to be used; only water is approved as the cleaning solution. Only clean portable water is authorized for cleaning NOVATION Heat Exchanger condensers. Carefully remove any foreign objects or debris attached to the coil face or trapped within the mounting frame and brackets. Using a high pressure water sprayer, purge any soap or industrial cleaners from hose and/or dilution tank prior to wetting the coil.

Clean condenser face by spraying the coil core steadily and uniformly from top to bottom directing the spray straight into or toward the coil face. Do not exceed 900 psig or a 45 degree angle; nozzle must be at least 12" (30 cm) from the coil face. Reduce pressure and use caution to prevent damage to air centers (fins). Do not fracture the braze between air centers and refrigerant tubes. Allow water to drain from the coil core and check for refrigerant leaks prior to startup.

NOTE: Please see the NOVATION Heat Exchanger Condenser Service section for specific information on the NOVATION Heat Exchanger coil.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

Chemical cleaner should NOT be used on the aluminum NOVATION condenser. Damage to the coil can occur. Only approved cleaner is recommended.

Routine Cleaning of Round−Tube Coil Surfaces

Monthly cleaning with Totaline® environmentally sound coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement parts division as part number P902-0301 for a one gallon container, and part number P902-0305 for a 5 gallon container. It is recommended that all round−tube coils, including standard aluminum, pre-coated, copper/copper or E-coated coils be cleaned with the Totaline environmentally sound coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline environmentally sound coil cleaner is non-flammable, hypoallergenic, non−bacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Totaline Environmentally Sound Coil Cleaner Application Equipment

- $2^1/_2$ gallon garden sprayer
- water rinse with low velocity spray nozzle

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in corrosion and damage to the unit.

Harsh chemicals, household bleach or acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline environmentally sound coil cleaner as described above.

⚠ CAUTION

UNIT RELIABILITY HAZARD

Failure to follow this caution may result in reduced unit performance.

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop.

Totaline Environmentally Sound Coil Cleaner Application Instructions

1. Proper eye protection such as safety glasses is recommended during mixing and application.
2. Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally sound coil cleaner in a $2^1/_2$ gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F.

NOTE: Do NOT USE water in excess of 130°F, as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline® environmentally sound coil cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.
8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes.
10. Ensure surfaces are not allowed to dry before rinsing. Reapplying cleaner as needed to ensure 10-minute saturation is achieved.
11. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

Condensate Drain Pan (48/50PG03−14 Units)

Check and clean each year at the start of the cooling season. In winter, keep drains and traps dry.

To clean the condensate pan:

1. Disconnect condensate drain system from side or bottom drain connection.
2. Remove and clean trap.
3. Remove 4 screws securing condensate pan access cover to unit. Save screws and panel.
4. Slide condensate pan out from unit and clean. Pan is made of non-corrosive plastic. Use a mild cleaner to remove heavy deposits of dirt and grime.
5. Replace pan in unit.
6. Replace condensate pan access cover with 4 screws saved from Step 3.
7. Re-attach and prime condensate trap.
8. Connect condensate drainage system.

Condensate Drain Pan (48/50PM16–28 Units)

Check and clean each year at the start of the cooling season. An access panel is located above the condensate connection to allow easy clean out of the condensate pan. The first time the panel is removed, the insulation behind the access panel will need to be cut away. Carefully cut the insulation with a knife or blade on three sides so the insulation can be folded out of the way during cleaning. Be careful not to damage components behind the insulation while cutting. Once cleaning is completed, fold the insulation back into place and secure the access panel in the original position.

Filters

Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to unit Installation Instructions for type and size.

Outdoor–Air Inlet Screens

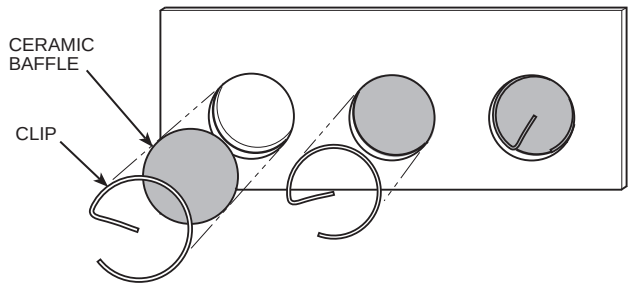
Clean screens with steam or hot water and a mild detergent. Do not use throwaway filters in place of screens. See unit installation instructions for quantity and size.

Main Burner (48PG and PM)

At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames. Refer to Main Burners section.

Flue Gas Passageways (48PG and PM)

The flue collector box and heat exchanger cells may be inspected by opening heat section access door (Fig. 5), flue box cover, and main burner assembly. (See Fig. 50.) Refer to Main Burners section for burner removal sequence. If cleaning is required, clean tubes with a wire brush. Use Caution with ceramic heat exchanger baffles. When installing retaining clip, be sure the center leg of the clip extends inward toward baffle. (See Fig. 49.)



NOTE: One baffle and clip will be in each upper tube of the heat exchanger.

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Fig. 49 – Removing Heat Exchanger Ceramic Baffles and Clips

Combustion–Air Blower

Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bi-monthly to determine proper cleaning frequency.

To inspect blower wheel, open heat section door. Using a flashlight, look into the flue exhaust duct to inspect. If cleaning is required, remove motor and wheel assembly by removing the screws holding the flue box cover to the flue box. (See Fig. 50 or 51.) Remove the screws holding the inducer housing to the inlet plate. The wheel can then be removed from the motor shaft and cleaned with a detergent or solvent. Replace the wheel onto the motor shaft in the correct position and reassemble the flue cover onto the flue box.

Lubrication

Compressors

Each compressor is charged with the correct amount of oil at the factory.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in damage to unit components.

The compressor is in a Puron refrigerant system and uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Avoid exposure of the oil to the atmosphere.

Polyolester (POE) compressor lubricants are known to cause long term damage to some synthetic roofing materials. Exposure, even if immediately cleaned up, may cause roofing materials to become brittle (leading to cracking) within a year. When performing any service which may risk exposure of compressor oil to the roof, take appropriate precautions to protect roofing. Procedures which risk oil leakage include compressor replacement, repairing refrigerant leaks, and replacing refrigerant components. To prepare rooftop:

1. Cover extended roof work area with an impermeable plastic dropcloth or tarp. Make sure a 10 x 10 ft area around the work area is covered.
2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills and prevent run-offs. Towel will also protect dropcloth from tears caused by tools or components.
3. Place terry cloth shop towel inside the unit directly under components to be serviced to prevent spills through the bottom of the unit.
4. Perform the required service.
5. Remove and dispose of any oil contaminated material per local codes.

Indoor Fan Shaft Bearings (Sizes 03–14)

The indoor fan has permanently sealed bearings. No field lubrication is necessary.

Indoor Fan Shaft Bearings (Sizes 16–28)

Lubricate bearings at least every 6 months with suitable bearing grease. Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

* Preferred lubricant because it contains rust and oxidation inhibitors.

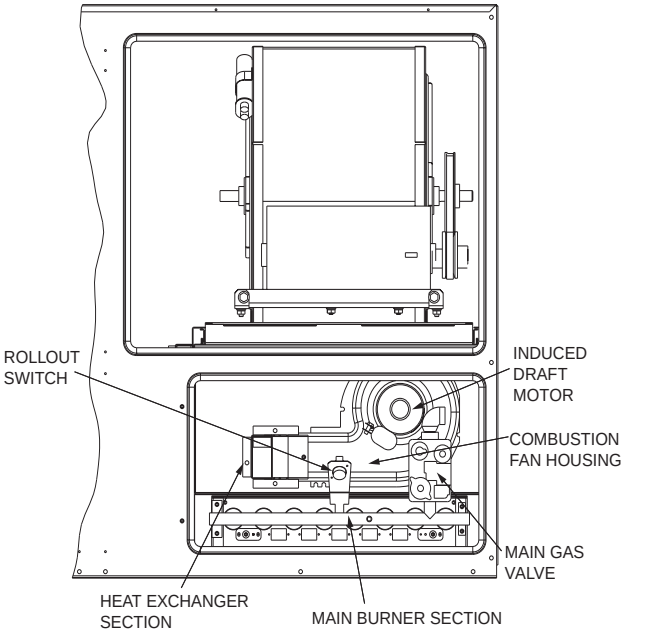


Fig. 50 – 48PG03–14 Typical Gas Heating Section (48PG03–07 Shown)

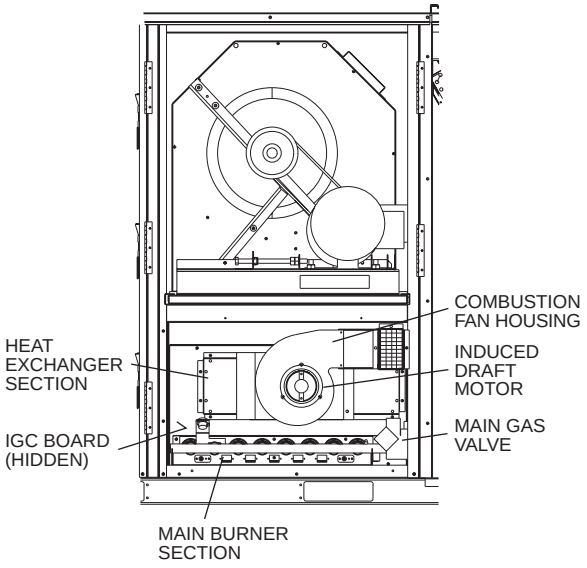


Fig. 51 – 48PM16–28 Typical Gas Heating Section

Condenser and Evaporator–Fan Motor Bearings

The condenser-fan and evaporator-fan motors have permanently sealed bearings, so no field lubrication is necessary.

Economizer or Manual Outside Air Damper

If blade adjustment is required, refer to unit or accessory installation instructions.

Evaporator Fan Service and Replacement

The units feature a slide-out fan deck for easy servicing of the indoor-fan motor, pulleys, belt, and bearings. To service components in this section, perform the following procedure:

1. Turn off unit power.
2. Open the fan section access door.
3. Remove two no. 10 screws at front of slide-out fan deck. Save screws. (See Fig. 52 or 53.)
4. For 48/50PG03–14 units, disconnect the electrical wires connected to the slide–out fan deck (supply air thermistor and fan status switch if installed). Wires may be damaged if not disconnected. For 48/50PM16–28 units, disconnect the limit switch wires located on the right side of the fan deck (48 series only). Other wires do not need to be disconnected.
5. Fan deck can now be slid out to access serviceable components.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in damage to the unit.

DO NOT SLIDE FAN DECK OUT PAST THE FAN DECK STOP. If further access is required, the fan deck must be supported. Make sure plugs and wiring are not pinched between fan housing and unit sheet metal post.

6. To replace fan deck to operating position, slide fan deck back into the unit. Secure with the two no. 10 screws removed in Step 3.
7. Re-attach electrical wires.
8. Close fan section access door.
9. Restore power to unit.

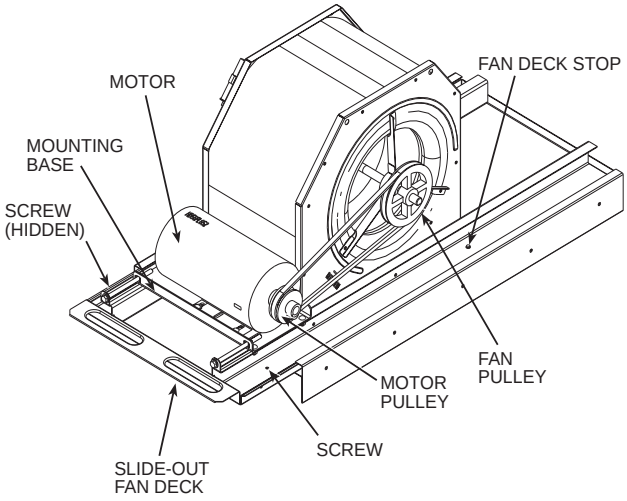


Fig. 52 – 48/50PG03–14 Evaporator–Fan Motor Adjustment

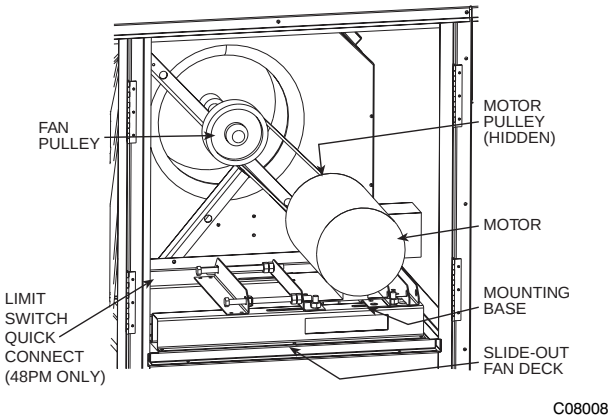


Fig. 53 – 48/50PM16–28 Evaporator–Fan Motor Adjustment

Table 27 – Belt Tension Adjustment

48PM	VOLTAGE	BELT TENSION (lb) Unit Model Number Position 10							
		A,J	B,K	C,L	D,M	E,N	F,P	G,Q	H,R
16	230	4.8	5.1	5.6	4.5	NA	4.7	5.0	5.5
	460	4.8	5.1	5.6	4.5	NA	4.7	5.0	5.5
	575	5.3	5.1	5.6	4.5	NA	5.2	5.0	5.5
20	230	4.8	5.1	5.6	4.5	NA	4.7	5.0	5.5
	460	4.8	5.1	5.6	4.5	NA	4.7	5.0	5.5
	575	5.3	5.1	5.6	4.5	NA	5.2	5.0	5.5
24	230	4.8	5.1	5.6	4.5	NA	4.7	5.0	5.5
	460	4.8	5.1	5.6	4.5	NA	4.7	5.0	5.5
	575	5.3	5.1	5.6	4.5	NA	5.2	5.0	5.5
28	230	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5
	460	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5
	575	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5

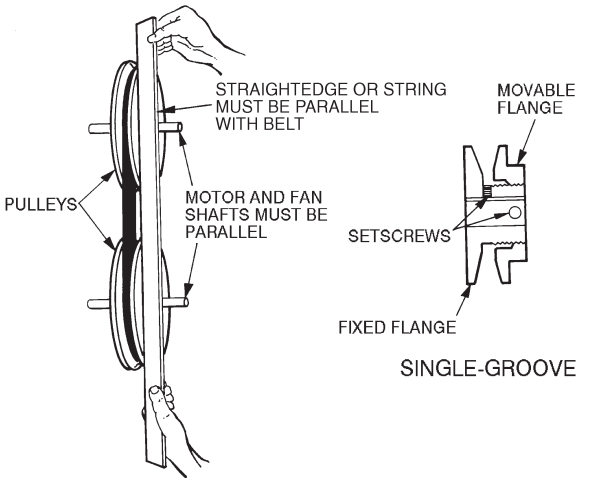
50PM	VOLTAGE	BELT TENSION (lb) Unit Model Number Position 10							
		A,J	B,K	C,L	D,M	E,N	F,P	G,Q	H,R
16	230	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	460	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	575	5.3	5.1	5.6	4.5	5.3	5.1	5.6	4.5
20	230	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	460	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	575	5.3	5.1	5.6	4.5	5.3	5.1	5.6	4.5
24	230	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	460	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	575	5.3	5.1	5.6	4.5	5.3	5.1	5.6	4.5
28	230	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5
	460	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5
	575	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5

Evaporator Fan Performance Adjustment (Fig. 52–54)

Fan motor pulleys are factory set for speed shown in Appendix D.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen nuts on the 4 carriage bolts in the mounting base. Using adjusting bolts and plate, slide motor and remove belt.
3. Loosen movable-pulley flange setscrew. (See Fig. 54.)
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Appendix D.
   See Appendix D for air quantity limits.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Appendix D for speed change for each full turn of pulley flange.)
6. Replace belts.
7. Realign fan and motor pulleys:
   a. Loosen fan pulley setscrews.
   b. Slide fan pulley along fan shaft.
   c. Make angular alignment by loosening motor from mounting plate.
8. Tighten belts.
9. Restore power to unit.



C06041

Fig. 54 – Evaporator–Fan Alignment and Adjustment

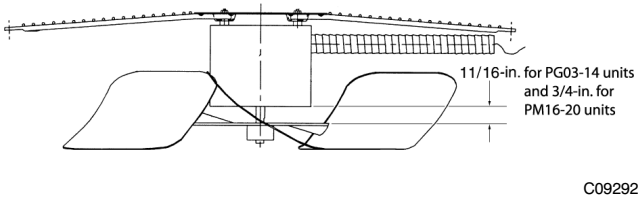
Evaporator Fan Belt Tension Adjustment

To adjust belt tension:

1. Turn off unit power.
2. Slide out fan deck to service position as shown in Evaporator Fan Service and Replacement section above.
3. Loosen motor mounting plate bolts.
4. Move motor mounting plate to adjust to proper belt tension. Motor adjuster bolts may be used to tighten belts. (See Fig. 52 or 53.) Do not overtighten belt. See Table 27 for 48/50PM16–28 size belt tension
5. Check for proper belt alignment. Adjust if necessary.
6. Tighten motor mounting plate bolts to lock motor in proper position.
7. Return fan deck back into operating position.
8. Restore power to unit.

Condenser-Fan Adjustment (Fig. 55)

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 55.
4. Tighten setscrews and replace condenser-fan assembly.
5. Turn on power to unit.



C09292

Fig. 55 – Condenser–Fan Adjustment

NOVATION Heat Exchanger Condenser Service and Replacement

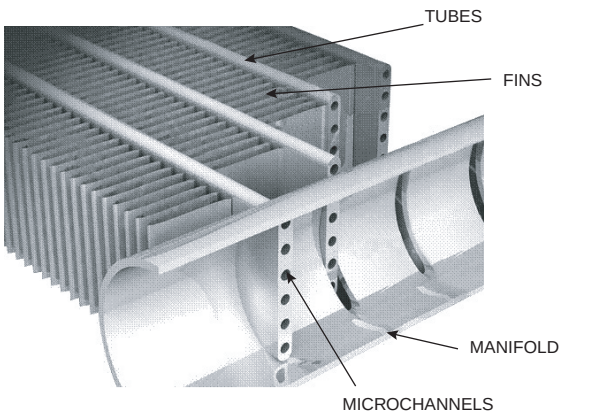
The condenser coil in this unit is a NOVATION heat exchanger surface. The NOVATION heat exchanger is an all–aluminum construction with fins over a single–depth crosstube. The crosstubes have multiple small passages through which the refrigerant passes from header to header on each end. (See Fig. 56.) The all–aluminum construction provides increased resistance to corrosion over aluminum fins on copper tubes in normal and mild marine applications.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

Refer to product data manual for coil usage in coastal or industrial applications.



C07273

Fig. 56 – NOVATION Heat Exchanger Coils

Repairing Tube Leaks

RCD offers service repair kits for repairing tube leaks in the crosstubes. These kits include approved braze materials and instructions specific to the aluminum NOVATION heat exchanger coil.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

Use of other than approved repair procedures may affect the pressure rating or the corrosion resistance of the NOVATION heat exchanger condenser coil.

Replacing the NOVATION Heat Exchanger Coil

The service replacement coil is preformed and is equipped with transition joints with copper stub tubes. When brazing the connection joints to the unit tubing, use a wet cloth around the aluminum tube at the transition joint. Avoid applying torch flame directly onto the aluminum tubing.

Verify Sensor Performance

Verify that thermistor, transducer, and switch inputs are reading correctly. These values can be accessed through the Scrolling Marquee display in the Temperatures, Pressures, and Inputs menus. Some values will depend on configuration choices. Refer to the Control Set Up Checklist completed for the specific unit installation and to the configuration tables in Appendix A.

Economizer Operation During Power Failure

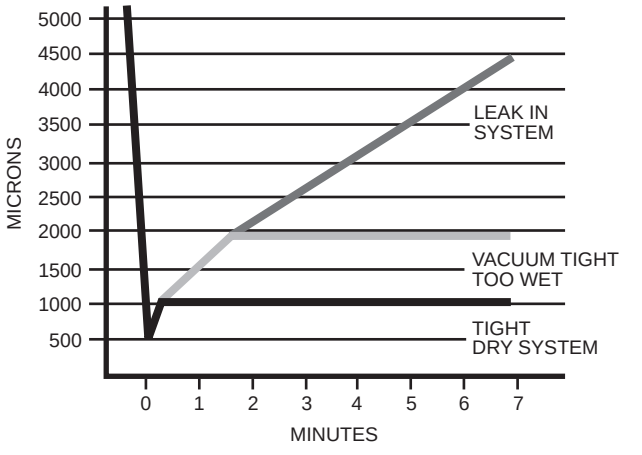
Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate damper motor.*

Evacuation

Proper evacuation of the system will remove noncondensables and ensure a tight, dry system before charging. Evacuate from both high and low side ports. Never use the system compressor as a vacuum pump. Refrigerant tubes and indoor coil should be evacuated to 500 microns. Always break a vacuum with dry nitrogen. The two possible methods are the deep vacuum method and the triple evacuation method.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a minimum vacuum of 500 microns and a vacuum gauge capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. (See Fig. 57.)



C06264

Fig. 57 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is capable of pumping down to 28−in. of mercury and system does not contain any liquid water. Proceed as follows:

1. Pump system down to 28−in. of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system, absorbing moisture.
5. Repeat this procedure. System will then contain minimal amounts of contaminants and water vapor.

Refrigerant Charge

Amount of refrigerant charge is listed on unit nameplate. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures. Unit panels must be in place when unit is operating during charging procedure.

Puron® (R-410A) refrigerant systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

Puron (R−410A) refrigerant systems operate at higher pressures than standard R−22 systems. Do not use R−22 service equipment or components on Puron refrigerant equipment. Gauge set, hoses, and recovery system must be designed to handle Puron refrigerant. If unsure about equipment, consult the equipment manufacturer.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

No Charge

Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to unit nameplate).

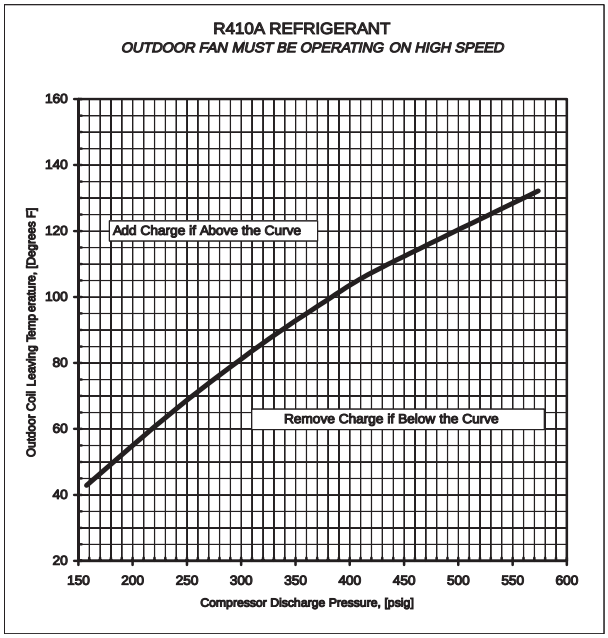
NOTE: System charge for units with Humidi-MiZer™ system is greater than the system charge of the standard unit.

Low Charge Cooling

Using cooling charging chart (see Fig. 58−79), add or remove refrigerant until conditions of the chart are met. An accurate pressure gauge and temperature-sensing device is required. Charging is accomplished by ensuring the proper amount of liquid subcooling. Connect pressure gauge to the compressor discharge service valve. Connect temperature sensing device to the liquid line between the condenser and the TXV (thermostatic expansion valve), and insulate it so that ambient temperature does not affect reading.

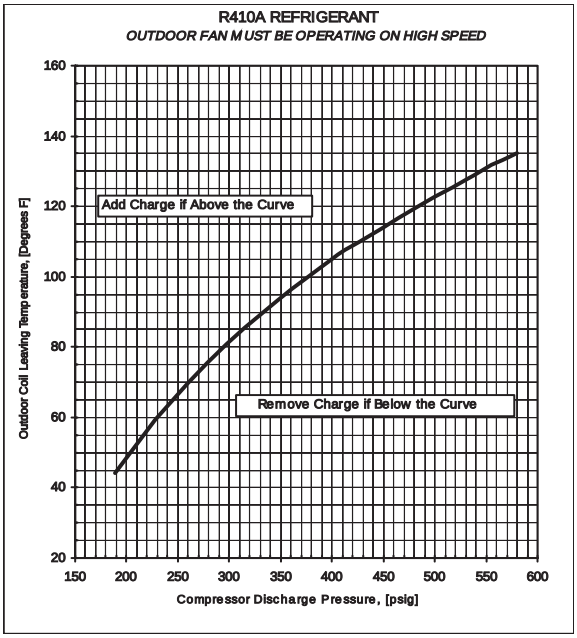
To Use the Cooling Charging Chart, Standard Unit

NOTE: All circuits must be running in normal cooling mode. Indoor airflow must be within specified air quantity limits for cooling. (See Appendix D.) All outdoor fans must be on and running at high speed. Use the Cooling Service Test Outdoor Fan Override function to start all outdoor fans.



C07038

Fig. 58 – Charging Chart — 48/50PG03



C07039

Fig. 59 – Charging Chart — 48/50PG04

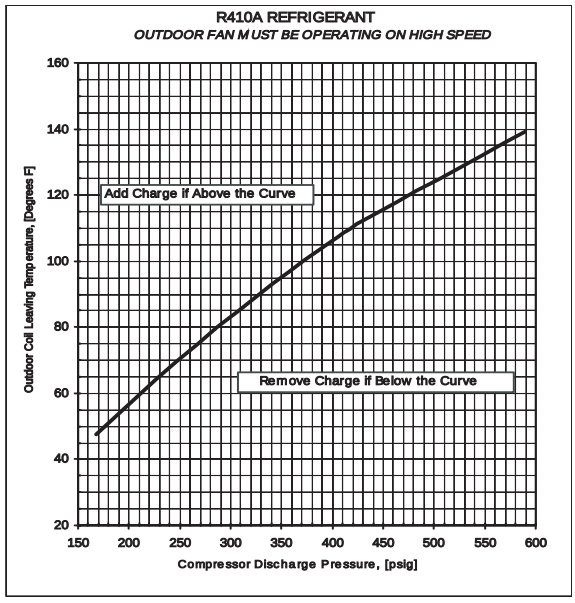
Use the temperature and pressure readings, and find the intersection point on the cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully recover some of the charge. Recheck suction pressure as charge is adjusted.

The TXV is set to maintain between 10 and 15 degrees of superheat at the compressors. The valves are factory set and cannot be adjusted. Do not use A TXV designed for use with R-22.

To Use the Cooling Charging Charts, Units With Humidi−Mizer™ Adaptive Dehumidification System

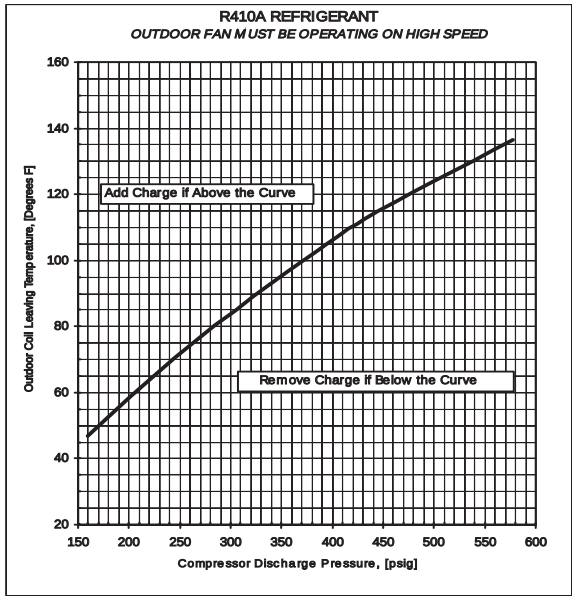
NOTE: All circuits must be running in normal cooling mode. Indoor airflow must be within specified air quantity limits for cooling. (See Appendix D.) All outdoor fans must be on and running at high speed. Use the Cooling Service Test Outdoor Fan function (***Service Test→COOL→OF.OV***) to start all outdoor fans.

If the outdoor temperature is low, the Motormaster® outdoor fan control device may need to be temporarily bypassed by rewiring the power leads to obtain full speed.



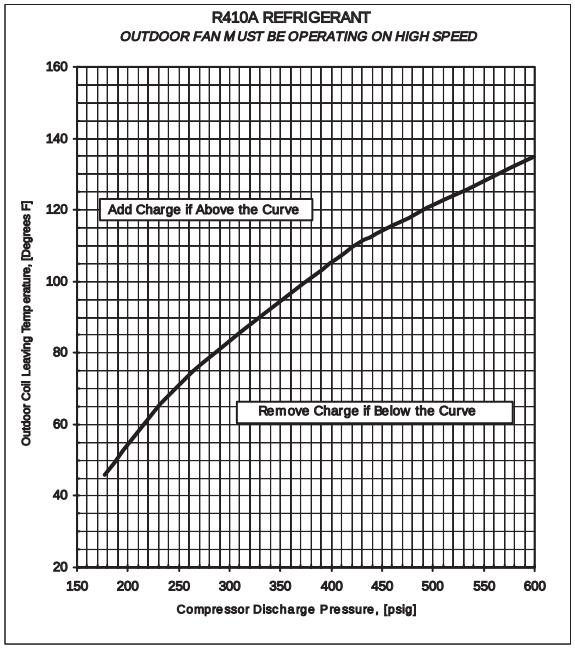
C07040

Fig. 60 – Charging Chart — 48/50PG05



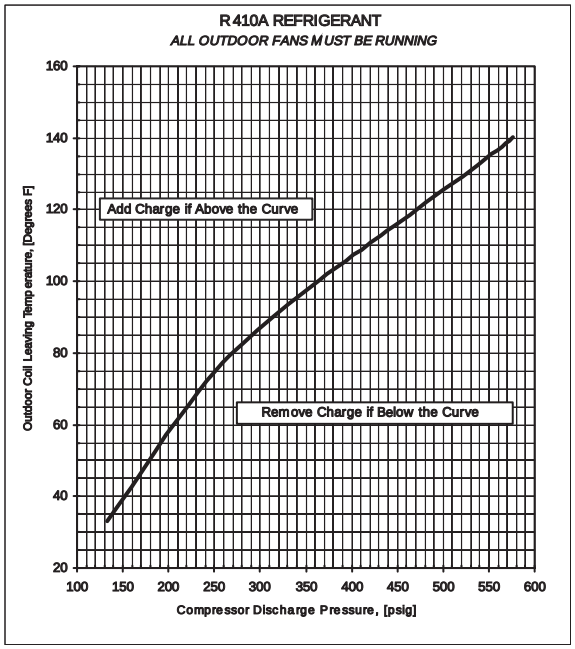
C07041

Fig. 61 – Charging Chart — 48/50PG06



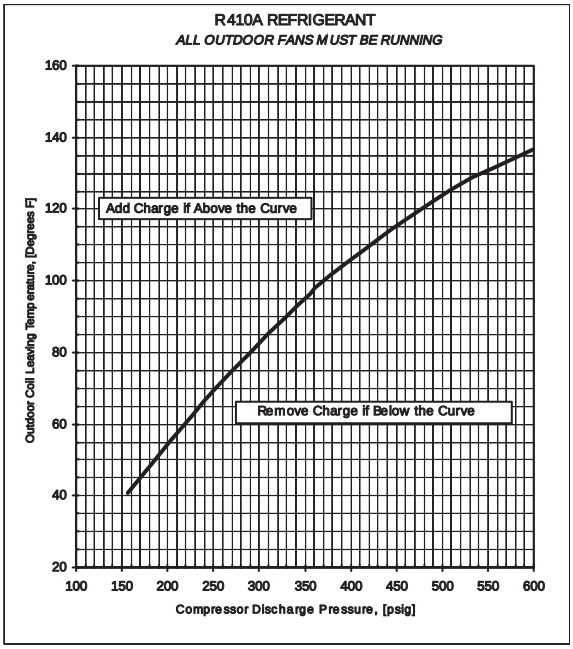
C07042

Fig. 62 – Charging Chart — 48/50PG07



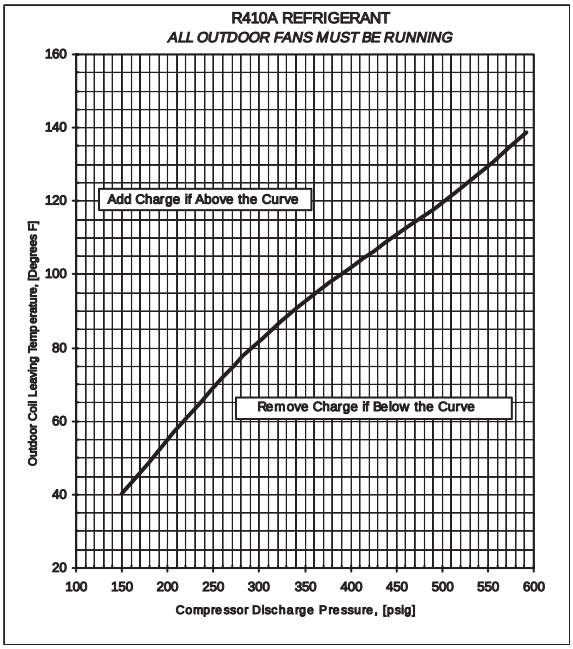
C06265

Fig. 63 – Charging Chart — 48/50PG08 and 09



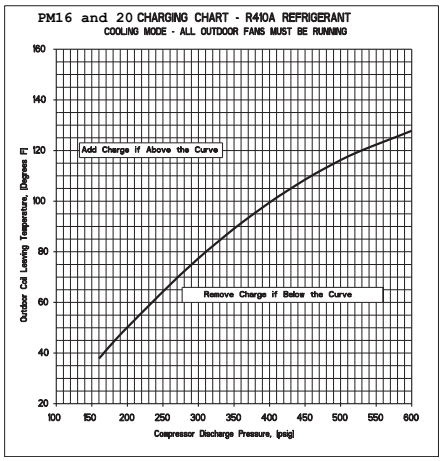
C06266

Fig. 64 – Charging Chart — 48/50PG12



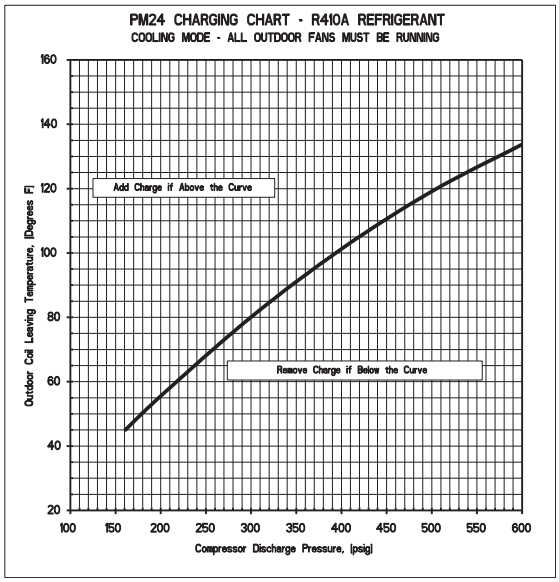
C06267

Fig. 65 – Charging Chart — 48/50PG14



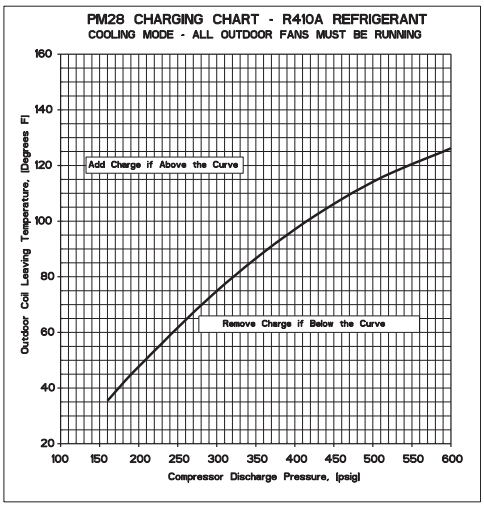
C09294

Fig. 66 – Charging Chart – 48/50PM16 and 20



C08048

Fig. 67 – Charging Chart – 48/50PM24



C08049

Fig. 68 – Charging Chart – 48/50PM28

Be sure unit is in normal cooling mode by checking that the RH2 solenoid coil(s) and the CRC relay are deenergized (control outputs off). Adjust charge per the charging charts as described in the To Use The Cooling Charging Charts, Standard Unit section. Switch system to run in the dehumidification mode for 5 minutes. Dehumidification mode is when the RH2 solenoid coil(s) and the CRC relay are energized. Switch back to cooling mode to recheck pressures and temperatures on the charging chart and adjust charge if necessary. If charge adjustment is necessary, then repeat the steps in this paragraph until no charge adjustment is necessary. When no more charge adjustment is necessary after switching from Dehumidification mode back to Cooling mode, then charge adjustment procedure is complete. Remove jumper from the outdoor motor speed controller.

Puron® Refrigerant

Puron refrigerant operates at 50 to 70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron refrigerant. Do not mix with components that have been used with other refrigerants. Puron refrigerant, as with other HFCs, is only compatible with POE oils.

Recovery cylinder service pressure rating must be 400 psig. Puron systems should be charged with liquid refrigerant. Use a commercial-type metering device in the manifold hose. Manifold sets should be 750 psig high-side and 200 psig low-side with 520 psig low-side retard. Use hoses with 750 psig service pressure rating. Leak detectors should be designed to detect HFC refrigerant.

Table 28 – Altitude Compensation*

48PG03–07

ELEVATION (ft)	NATURAL GAS ORIFICE†	PROPANE ORIFICE†
0-1,999	45	52
2,000	47	52
3,000	47	53
4,000	47	53
5,000	48	53
6,000	48	53
7,000	48	53
8,000	49	54
9,000	49	54
10,000	50	54
11,000	51	54
12,000	51	55
13,000	52	55
14,000	52	56

48PG08–14

ELEVATION (ft)	NATURAL GAS ORIFICE†	PROPANE ORIFICE†
0-1,999	43	50
2,000	44	51
3,000	44	51
4,000	44	51
5,000	45	51
6,000	45	52
7,000	47	52
8,000	47	52
9,000	47	53
10,000	48	53
11,000	49	53
12,000	50	54
13,000	50	54
14,000	51	55

48PG08–14

ELEVATION (ft)	NATURAL GAS ORIFICE†	PROPANE ORIFICE†
0-1,999	30	38
2,000	30	40
3,000	31	40
4,000	31	41
5,000	31	41
6,000	31	42
7,000	32	42
8,000	32	43
9,000	32	43
10,000	35	44
11,000	36	44
12,000	37	45
13,000	38	46
14,000	39	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes. Includes a 4% input reduction per each 1000 ft.

†Orifices available through your Carrier dealer.

Gas Valve Adjustment (48PG and PM)

The gas valve opens and closes in response to the thermostat or limit control.

When power is supplied to valve terminals W2 (High Fire) and C1, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body.

To adjust regulator:

1. Set unit at setting for no call for heat.
2. Turn main gas valve to OFF position.
3. Remove $^1/_8$-in. pipe plug from manifold pressure tap connection. Install a suitable pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw. (See Fig. 69.)
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. The setting is 3.50 in. wg on sizes 03-14 and 3.00 on size 16–28.
8. Once desired pressure is established, set unit setting for no call for heat, turn off main gas valve, remove pressure-measuring device, and replace $^1/_8$-in. pipe plug and screw cap.

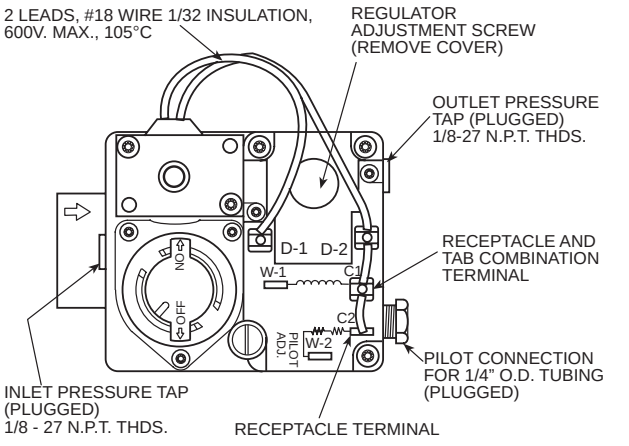


Fig. 69 – Typical Gas Valve (20–28 Sizes Shown)

Table 29 – Altitude Compensation* – 48PM16–20

NATURAL GAS

ELEVATION (ft)	NATURAL GAS ORIFICE SIZE†		
	Low Heat (D,L)	Medium Heat (E,M)	High Heat (F,N)
0-1,999	29	30	29
2,000	29	30	29
3,000	30	31	30
4,000	30	31	30
5,000	30	31	30
6,000	30	31	30
7,000	31	32	31
8,000	31	32	31
9,000	31	32	31
10,000	32	33	32

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes. Includes a 4% input reduction per each 1000 ft.

†Orifices available through the local Carrier dealer.

PROPANE GAS

ELEVATION (ft)	PROPANE GAS ORIFICE SIZE†		
	Low Heat (D,L)	Medium Heat (E,M)	High Heat (F,N)
0-1,999	35	38	35
2,000	36	39	36
3,000	36	39	36
4,000	37	40	37
5,000	37	40	37
6,000	38	41	38
7,000	39	42	39
8,000	40	43	40
9,000	41	44	41
10,000	42	45	42

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes. Includes a 4% input reduction per each 1000 ft.

†Orifices available through the local Carrier dealer.

High Altitude (48PG and PM)

For high altitude applications greater than 2,000 ft the heat input rate should be reduced. The higher the altitude is above sea level, the less oxygen is in the air. See Table 28 for orifice sizing. A high altitude kit is available to convert unit for altitudes up to 7,000 ft.

Main Burners (48PG and 48PM)

For all applications, main burners are factory set and should require no adjustment.

Main Burner Removal

1. Shut off (field-supplied) manual main gas valve.
2. Shut off power to unit.
3. Open gas section access door.
4. Disconnect gas piping from gas valve inlet.
5. Remove wires from gas valve.
6. Remove wires from rollout switch.
7. Remove sensor wire and ignitor cable from IGC board.
8. Remove 2 screws that hold the burner assembly to vestibule plate. For 48PM16–28 units, also remove the 2 screws securing the manifold bracket to the basepan.
9. Rotate the burner/manifold assembly to the right, away from the flue extension and lift burner/manifold assembly out of unit.

Cleaning and Adjustment

1. Remove burner rack from unit as described in Main Burner Removal section above.
2. Inspect burners, and if dirty, remove burners from rack. The two outer burners have the flame crossover closed off in order to prevent gas flow from exiting the sides of the burner assembly. To prevent ignition problems, make sure the outer burners are returned to their original position when done servicing.
3. Using a soft brush, clean burners and crossover port as required.
4. Adjust spark gap. (See Fig. 70.)
5. Reinstall burners on rack.
6. Reinstall burner rack as described above.

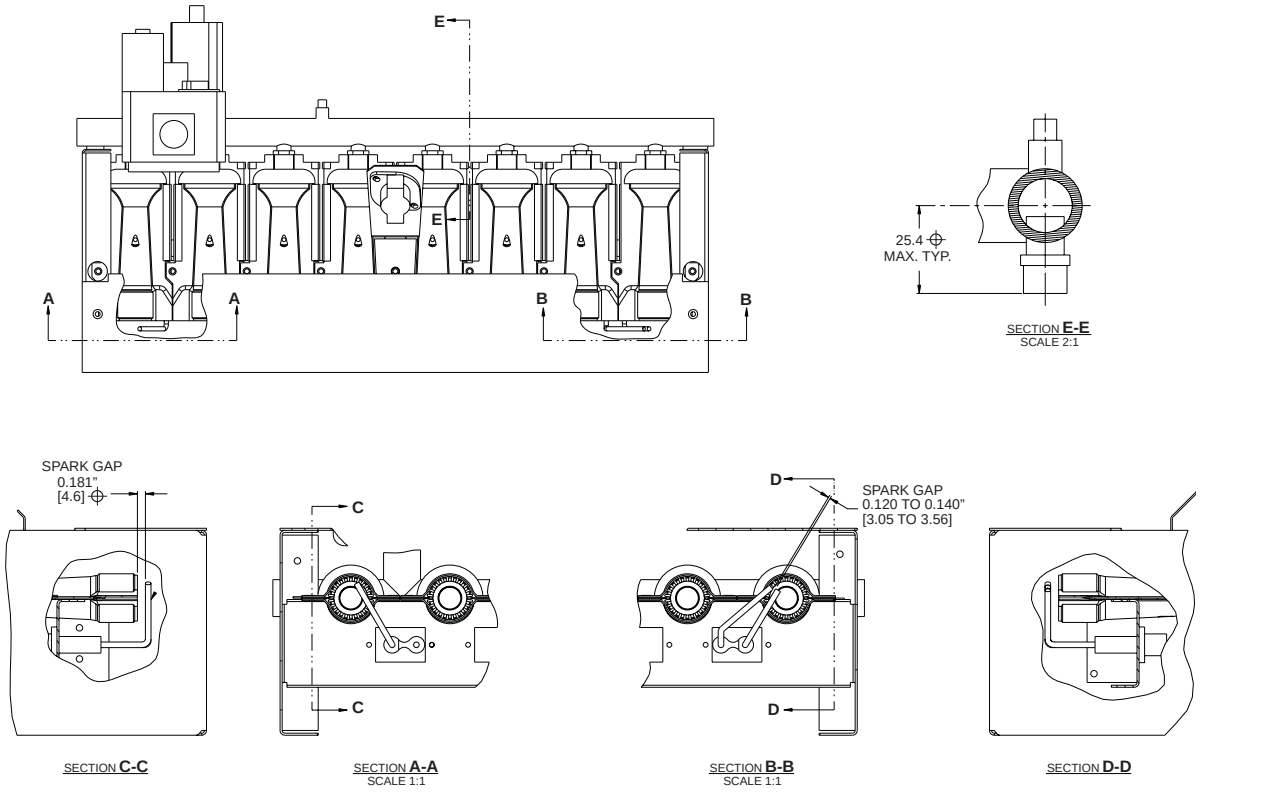


Fig. 70 – Spark Gap Adjustment

Filter Drier

Replace whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig. Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with Puron® refrigerant is required on every unit.

Protective Devices

Compressor Rotation

Overcurrent

Each compressor has internal line break motor protection.

Overtemperature

Each compressor has an internal protector to protect it against excessively high discharge gas temperatures.

High–Pressure Switch

If the high-pressure switch trips, the compressor will shut down and the current sensor (3-phase units only) will not detect current. See the Current Sensor section below for more information.

Current Sensor (CS) (3–Phase Units Only)

The purpose of the CS is to detect losses in compressor power. After detecting a loss in compressor power, unit control locks out the compressor for 15 minutes. After 15 minutes, the alarm will automatically reset. If this alarm occurs 3 times consecutively, the compressor will remain locked out until an alarm reset is initiated via CCN or manually via the Scrolling Marquee display (see Alarms and Alerts section for more details).

Evaporator Fan Motor Protection

Indoor-fan motors less than 5 hp are equipped with internal overcurrent and overtemperature protection. Protection devices reset automatically. Disconnect and lock out power when servicing motor. Indoor-fan motors 5 hp and larger are equipped with a manual reset, calibrated trip, magnetic circuit breaker and overcurrent protection. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Condenser–Fan Motor Protection

Each condenser-fan motor is internally protected against overtemperature.

Fuses are located in the control box and feed power to the condenser fan motors. Always replace blown fuses with the correct size fuse as indicated on the unit fuse label.

Saturated Suction Pressure (SSP)

If the SSP for a particular circuit is reading below the alarm set point for an extended period of time, that circuit will be shut down. After 15 minutes, the alarm will automatically reset. If this alarm occurs 3 times consecutively, the circuit will remain locked out until an alarm reset is initiated via CCN or manually via the Scrolling Marquee display (see Alarms and Alerts section for more details).

Relief Devices

All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side and are located at the suction line service port. Protect joint during brazing operations near joint.

Control Circuit, 24–V

Each control circuit is protected against overcurrent by a circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting.

Replacement Parts

A complete list of replacement parts may be obtained from any Carrier distributor upon request.

Diagnostic LEDs

The MBB, ECB, and IGC control boards have LED lights for diagnostic purposes. The meanings and error codes can be found in the troubleshooting section of this manual.

EnergyX

For units equipped with the EnergyX factory installed option, there will be an EnergyXv2 Supplement Installation Instructions in the unit's information packet. Refer to this supplement for details on service and Maintenance.

APPENDIX A — LOCAL DISPLAY AND CCN TABLES

MODE — RUN STATUS

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB-TABLE	CCN POINT	CCN WRITE STATUS	MENU WRITE STATUS
RUN STATUS				STATUS DISPLAY			
VIEW	Auto View of Run Status			(VIEW = Display only)			
HVAC	HVAC Mode Status	1=Disabled 2=Ventilation 3=Cool 4=Heat			HVACMODE		
OCC	Currently Occupied	No/Yes			OCCUPIED		
SAT	Suppy Air Temperature	xxx..x	°F		SAT_DISP		
ALRM	Current Alarms & Alerts	xx			ALRMALRT		
TIME	Time of Day	xx.xx	hh.mm		TIMECOPY		
VERS	Software Version Numbers			VERSIONS			
MBB	CESR131320-xx-xx	(xx-xx in table)			MODEL_NUMBER_01		
ECB	CESR131249-xx-xx				MODEL_NUMBER_02		
MARQ	CESR131171-xx-xx				MODEL_NUMBER_03		
MODE	Control Modes			MODEDISP			
SYS	Current System Mode	1=Disabled 2=Run Enabled 3=Service Test			SYS_MODE		
HVAC	Current HVAC Mode	1=Disabled 2=Ventilation 3=Cool 4=Heat			HVACMODE		
HV.DN	Remote HVAC Mode Disable	No/Yes			HVACDOWN	forcible	
EFF.C	Cool Setpoint In Effect	xx.x	°F		CSP_EFF		
EFF.H	Heat Setpoint In Effect	xx.x	°F		HSP_EFF		
OCC	Currently Occupied	No/Yes			OCCUPIED	forcible	forcible
T.OVR	Timed Override in Effect	No/Yes			MODETOVR		
LINK	Linkage Active	No/Yes			MODELINK		
D.LMT	Demand Limit In Effect	No/Yes			MODEDMDL		
C.LOC	Compressor OAT Lockout	No/Yes			COMPLOCK		
H.LOC	Heat OAT Lockout	No/Yes			HEATLOCK		
OK.EC	OK to Use Economizer?	No/Yes			ECONCOOL		
COOL	Cooling Status			COOLDISP			
DMD.C	Cooling Demand	xxx.x	^F		COOL_DMD		
AVL.C	Available Cooling Stages	x			AVLCSTGS		
REQ.C	Requested Cooling Stages	x			REQCSTGS		
MAX.C	Max Allowed Cool Stages	x			MAXCSTGS	forcible	
LMT.C	Max Cool Stage In Effect	x			CSTGLIMT		
IDF	Indoor Fan State	Off/On			IDFSTATE		
F.SPD	Commanded Fan Speed	xxx	%		FANSPEED		
OFC.1	Outdoor Fan 1 Relay	Off/On			OFC_1		
OFC.2	Outdoor Fan 2 Relay	Off/On			OFC_2		
OFC.3	Outdoor Fan 3 Relay	Off/On			OFC_3		
CRC	Cool->Reheat1 Control	Off/On			CRC		
CIR.A	Refrigerant Circuit A			CIRCUIT A			
CMP.A	Circuit A Compressor(s)	Off/On			COMP_A		
TG.A	Timeguard A	xxx	sec		TIMGD_A		
RH2.A	Reheat2 Valve A	Off/On			RH2_A		
SST.A	Sat. Suction Temp A	xxx.x	°F		SST_A		
SSP.A	Suction Pressure A	xxx.x	psig		SSP_A		
SCT.A	Sat. Condenser Temp A	xxx.x	°F		SCT_A		
SCP.A	Condenser Pressure A	xxx.x	psig		SCP_A		
CIR.B	Refrigerant Circuit B			CIRCUIT B			
CMP.B	Circuit B Compressor	Off/On			COMP_B		
TG.B	Timeguard B	xxx	sec		TIMGD_B		
RH2.B	Reheat2 Valve B,C	Off/On			RH2_B		
SST.B	Sat. Suction Temp B	xxx.x	°F		SST_B		
SSP.B	Suction Pressure B	xxx.x	psig		SSP_B		
SCT.B	Sat. Condenser Temp B	xxx.x	°F		SCT_B		
SCP.B	Condenser Pressure B	xxx.x	psig		SCP_B		
CIR.C	Refrigerant Circuit C			CIRCUIT C			
CMP.C	Circuit C Compressor	Off/On			COMP_C		
TG.C	Timeguard C	xxx	sec		TIMGD_C		
RH2.C	Reheat2 Valve B,C	Off/On			RH2_B		
SST.C	Sat. Suction Temp C	xxx.x	°F		SST_C		
SSP.C	Suction Pressure C	xxx.x	psig		SSP_C		
SCT.C	Sat. Condenser Temp C	xxx.x	°F		SCT_C		
SCP.C	Condenser Pressure C	xxx.x	psig		SCP_C		

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — RUN STATUS (cont)

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB-TABLE	CCN POINT	CCN WRITE STATUS	MENU WRITE STATUS
HEAT	Heating Status			HEATDISP			
DMD.H	Heating Demand	xxx.x	^F		HEAT_DMD		
AVL.H	Available Heating Stages	x			AVLHSTGS		
REQ.H	Requested Heating Stages	x			REQHSTGS		
MAX.H	Max Allowed Heat Stages	x			MAXHSTGS	forcible	
LMT.H	Max Heat Stage In Effect	x			HSTGLIMT		
IDF	Indoor Fan State	Off/On			IDFSTATE		
F.SPD	Commanded Fan Speed	xxx	%		FANSPEED		
HT.1	Heat Stage 1 Relay	Off/On			HEAT_1		
TG.H1	Heat Stage 1 Timeguard	xxx	sec		TIMGD_H1		
HT.2	Heat Stage 2 Relay	Off/On			HEAT_2		
TG.H2	Heat Stage 2 Timeguard	xxx	sec		TIMGD_H2		
ECON	Economizer Status			ECONDISP			
EC.CP	Econo Commanded Position	xxx	%		ECONOCMD		
EC.AP	Econo Actual Position	xxx	%		ECONOPOS		
EC.MP	Min Position in Effect	xxx	%		MIN_POS	forcible	
IAQ.S	IAQ Level (switch)	Low/High			IAQIN		
IAQ	IAQ Level (sensor)	xxxx			IAQ		
OAT	Outdoor Air Temperature	xxx.x	°F		OA_TEMP		
ENTH	Outdoor Enthalpy Switch	Low/High			ENTHALPY		
OAQ	OAQ Level (sensor)	xxxx			OAQ		
PE.1	Power Exhaust 1 Relay	Off/On			PE_1		
PE.2	Power Exhaust 2 Relay	Off/On			PE_2		
OAU	Outside Air Unit Status			OAUDISP			
OA.RN	OAU System Run State	1=AUTO 2=OFF 3=TEST			OAU_RUN		
OA.OP	OAU Operating Mode	0=Off 1=ERV (DCV) 2=Free Cooling 3=OA Tempering 4=Defrost 5=Test 6=Ext. Mode 1 7=Ext. Mode 2 8=Ext. Mode 3			OAU_MODE		
UPC	UPC Software Version	xxxx			UPC_VER		
OAU	OA Unit Software Version	xxxx			OAU_VER		
2P.DM	OAU 2-position Damper	Close/Open			OAUDMPR		
WHL	OAU Wheel Speed	xxx	%		OAUWHEEL		
LAT	OAU Leaving Air Temp	xxx.x	°F		OAU_LAT		
EXAT	OAU Exhaust Air Temp	xxx.x	°F		OAU_EXAT		
OA.MN	Minimum Outside Air CFM	xxxxx	CFM		MINOACFM		
DCV.M	Min DCV Outside Air CFM	xxxxx	CFM		MINDCVSP		
OA.FS	OAU OA Fan Speed	xxx	%		OAFANSPD		
A.OA	Actual Outside Air CFM	xxxxx	CFM		ACTOACFM		
C.OA	Command Outside Air CFM	xxxxx	CFM		CMDOACFM		
PE.OF	Power Exhaust CFM Offset	xxxxx	CFM		EXOFFSET		
EX.FS	OAU Exhaust Fan Speed	xxx	%		OAUPESPD		
A.EX	Actual Exhaust Air CFM	xxxxx	CFM		ACTEXCFM		
C.EX	Command Exhaust Air CFM	xxxxx	CFM		CMDEXCFM		
BP.SP	Building Pressure Setpnt	x.xx	in H2O		OAU_BPSP		
BP	Building Pressure	x.xx	in H2O		OAU_BP		
TM.LO	OA Tempring Lockout Temp	xx	°F		OATMPLOC		
TM.SP	OA Tempring SAT Setpoint	xx	°F		OATMPSPT		
OA.HT	OAU Tempering Heater	xxx	%		OAHEATER		
HRS	Component Run Hours			STRTHOUR			
A1	Compressor A1 Run Hours	xxxxx.xx	hours		HR_A1	forcible	
A2	Compressor A2 Run Hours	xxxxx.xx	hours		HR_A2	forcible	
B1	Compressor B1 Run Hours	xxxxx.xx	hours		HR_B1	forcible	
C1	Compressor C1 Run Hours	xxxxx.xx	hours		HR_C1	forcible	
CCH	Crankcase Heat Run Hours	xxxxx.xx	hours		HR_CCH	forcible	
IDF	Indoor Fan Run Hours	xxxxx.xx	hours		HR_IDF	forcible	
OFC.1	Outdoor Fan 1 Run Hours	xxxxx.xx	hours		HR_OFC_1	forcible	
OFC.2	Outdoor Fan 2 Run Hours	xxxxx.xx	hours		HR_OFC_2	forcible	
OFC.3	Outdoor Fan 3 Run Hours	xxxxx.xx	hours		HR_OFC_3	forcible	
HT.1	Heat Stage 1 Run Hours	xxxxx.xx	hours		HR_HTR_1	forcible	
HT.2	Heat Stage 2 Run Hours	xxxxx.xx	hours		HR_HTR_2	forcible	
PE.1	Power Exhaust1 Run Hours	xxxxx.xx	hours		HR_PE_1	forcible	
PE.2	Power Exhaust2 Run Hours	xxxxx.xx	hours		HR_PE_2	forcible	
ALRM	Alarm Relay Run Hours	xxxxx.xx	hours		HR_ALM	forcible	
CRC	Reheat1 Valve Run Hours	xxxxx.xx	hours		HR_CRC	forcible	
RH2.A	Reheat2 Valve A Run Hrs	xxxxx.xx	hours		HR_RH2_A	forcible	
RH2.B	Reheat2 Valve BC Run Hrs	xxxxx.xx	hours		HR_RH2_B	forcible	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — RUN STATUS (cont)

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB-TABLE	CCN POINT	CCN WRITE STATUS	MENU WRITE STATUS
STRT	Component Starts						
A1	Compressor A1 Starts	xxxxxx			ST_A1	forcible	
A2	Compressor A2 Starts	xxxxxx			ST_A2	forcible	
B1	Compressor B1 Starts	xxxxxx			ST_B1	forcible	
C1	Compressor C1 Starts	xxxxxx			ST_C1	forcible	
CCH	Crankcase Heat Starts	xxxxxx			ST_CCH	forcible	
IDF	Indoor Fan Starts	xxxxxx			ST_IDF	forcible	
OFC.1	Outdoor Fan 1 Starts	xxxxxx			ST_OFC_1	forcible	
OFC.2	Outdoor Fan 2 Starts	xxxxxx			ST_OFC_2	forcible	
OFC.3	Outdoor Fan 3 Starts	xxxxxx			ST_OFC_3	forcible	
HT.1	Heat Stage 1 Starts	xxxxxx			ST_HTR_1	forcible	
HT.2	Heat Stage 2 Starts	xxxxxx			ST_HTR_2	forcible	
PE.1	Power Exhaust 1 Starts	xxxxxx			ST_PE_1	forcible	
PE.2	Power Exhaust 2 Starts	xxxxxx			ST_PE_2	forcible	
ALRM	Alarm Relay Starts	xxxxxx			ST_ALM	forcible	
CRC	Reheat1 Valve Starts	xxxxxx			ST_CRC	forcible	
RH2.A	Reheat2 Valve A Starts	xxxxxx			ST_RH2_A	forcible	
RH2.B	Reheat2 Valve BC Starts	xxxxxx			ST_RH2_B	forcible	
(ALRMDISP) = CCN only)				ALRMDISP			
	Active Alarm 1 Code	xxx			ALMCODE1		
	Active Alarm 2 Code	xxx			ALMCODE2		
	Active Alarm 3 Code	xxx			ALMCODE3		
	Active Alarm 4 Code	xxx			ALMCODE4		
	Active Alarm 5 Code	xxx			ALMCODE5		
	Reset All Current Alarms	No/Yes			ALRESET	forcible	
	Reset Alarm History	No/Yes			ALHISCLR	forcible	
(GENERIC = CCN only)				GENERIC	up to 20 points		
(LON_DATA = CCN only)				LON_DATA			
	nviSpaceTemp	xxx.x	°F		NVI_SPT	Forcible	
	nviSetPoint	xxx.x	°F		NVI_SP	forcible	
	nvoSpaceTemp	xxx.x	°F		NVO_SPT		
	nvoUnitStatus.mode	xxxx			NVO_MODE		
	nvoUnitStatus.heat_out_p	xxx.x	%		NVO_HPRI		
	nvoUnitStatus.heat_out_s	xxx.x	%		NVO_HSEC		
	nvoUnitStatus.cool_out	xxx.x	%		NVO_COOL		
	nvoUnitStatus.econ_out	xxx.x	%		NVO_ECON		
	nvoUnitStatus.fan_out	xxx	%		NVO_FAN		
	nvoUnitStatus.in_alarm	xxx			NVO_ALRM		
	nviSetPtOffset	xxx.x	^F		NVI_SPTO	forcible	
	nviOutsideTemp	xxx.x	°F		NVI_OAT	forcible	
	nviOutsideRH	xxxx.x	%		NVI_OARH	forcible	
	nvoEffectSetPt	xxx.x	°F		NVO_EFSP		
	nvoOutsideTemp	xxxx.x	°F		NVO_OAT		
	nvoOutsideRH	xxx.x	%		NVO_OARH		
	nviSpaceRH	xxx.x	%		NVI_SPRH	forcible	
	nviCO2	xxxxx			NVI_CO2	forcible	
	nvoCO2	xxxxx			NVO_CO2		
	nvoTEMP1	xxx.x	°F		NVO_SAT		
	nvoTEMP2	xxx.x	°F		NVO_RAT		
	nviPCT1	xxx.x	%		NVI_RHSP	forcible	
	nvoPCT1	xxx.x	%		NVO_SPRH		
	nviDISCRETE1	Off/On			NVI_FSD	forcible	
	nviDISCRETE2	No/Yes			NVI_OCC	forcible	
	nviDISCRETE3	Off/On			NVI_IAQD	forcible	
	nvoDISCRETE1	Off/On			NVO_FSD		
	nvoDISCRETE2	No/Yes			NVO_OCC		
	nvoDISCRETE3	Off/On			NVO_IAQD		
	nciCO2Limit	xxxxx			NCI_CO2	forcible	
	nciSetPnts.occupied_cool	xxx.x	°F		NCI_OCSP	forcible	
	nciSetPnts.standby_cool	xxx.x	°F		NCI_SCSP	forcible	
	nciSetPnts.unoccupd_cool	xxx.x	°F		NCI_UCSP	forcible	
	nciSetPnts.occupied_heat	xxx.x	°F		NCI_OHSP	forcible	
	nciSetPnts.standby_heat	xxx.x	°F		NCI_SHSP	forcible	
	nciSetPnts.unoccupd_heat	xxx.x	°F		NCI_UHSP	forcible	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — SERVICE TEST

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB—TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
SERVICE TEST					MAINTENANCE DISPLAY			
TEST	Field Service Test Mode	Off/On		Off	(TEST = display only)	MAN_CTRL	forcible	forcible
INDP	Test Independent Outputs				TESTINDP			
ECON	Economizer Position Test	0 to 100	%	0		S_ECONO	forcible	forcible
E.CAL	Calibrate Economizer	Off/On		Off		S_ECOCAL	forcible	forcible
PE.1	Power Exhaust 1 Test	Off/On		Off		S_PE_1	forcible	forcible
PE.2	Power Exhaust 2 Test	Off/On		Off		S_PE_2	forcible	forcible
ALRM	Alarm Relay Test	Off/On		Off		S_ALMOUT	forcible	forcible
CCH	Crankcase Heat Test	Off/On		Off		S_CCH	forcible	forcible
OA.DM	OAU 2-position Damper	Close/ Open		Close		S_OADMPR	forcible	forcible
WHL	OAU Wheel Test	0 to 100	%	0		S_WHEEL	forcible	forcible
OA.OF	OAU OA Fan Speed Test	0 to100	%	0		S_OAFAN	forcible	forcible
OA.XF	OAU PE Fan Speed Test	0 to100	%	0		S_EXFAN	forcible	forcible
OA.HT	OAU Tempring Heater Test	0 to 100	%	0		S_OAHEAT	forcible	forcible
FANS	Test Fans				TESTFANS			
IDF	Indoor Fan Power Test	Off/On		Off		S_IDF	forcible	forcible
F.SPD	Indoor Fan Speed Test	0 to 100	%	0		S_FANSPD	forcible	forcible
OFC.1	Outdoor Fan 1 Test	Off/On		Off		S_OFC_1	forcible	forcible
OFC.2	Outdoor Fan 2 Test	Off/On		Off		S_OFC_2	forcible	forcible
OFC.3	Outdoor Fan 3 Test	Off/On		Off		S_OFC_3	forcible	forcible
COOL	Test Cooling				TESTCOOL			
CMP.A	Cool A Test	Off/On		Off		S_COMP_A	forcible	forcible
CMP.B	Cool B Test	Off/On		Off		S_COMP_B	forcible	forcible
CMP.C	Cool C Test	Off/On		Off		S_COMP_C	forcible	forcible
F.SPD	Reduced Cool Fan Speed	60 to 100	%	0		S_FSPDCL	forcible	forcible
OF.OV	Outdoor Fan Override	Off/On		Off		S_OFC_OV	forcible	forcible
HMZR	Test Humidimizer				TESTHMZR			
RH1.A	Reheat1 A Test	Off/On		Off		S_RH1_A	forcible	forcible
RH1.B	Reheat1 B Test	Off/On		Off		S_RH1_B	forcible	forcible
RH1.C	Reheat1 C Test	Off/On		Off		S_RH1_C	forcible	forcible
RH2.A	Reheat2 A Test	Off/On		Off		S2_RH2_A	forcible	forcible
RH2.B	Reheat2 B Test	Off/On		Off		S2_RH2_B	forcible	forcible
RH2.C	Reheat2 C Test	Off/On		Off		S2_RH2_C	forcible	forcible
F.SPD	Reheat2 Fan Speed	65 to 100	%	0		S_FSPDRH	forcible	forcible
CRC	Cool->Reheat1 Valve Test	Off/On		Off		S_CRC	forcible	forcible
RHV.A	Reheat2 Valve A Test	Off/On		Off		S_RH2_A	forcible	forcible
RHV.B	Reheat2 Valve B,C Test	Off/On		Off		S_RH2_B	forcible	forcible
HEAT	Test Heating				TESTHEAT			
HT.1	Heat Stage 1 Test	Off/On		Off		S_HEAT_1	forcible	forcible
HT.2	Heat Stage 2 Test	Off/On		Off		S_HEAT_2	forcible	forcible
F.SPD	Reduced Heat Fan Speed	65 to 100	%	0		S_FSPDHT	forcible	forcible

MODE — TEMPERATURES

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB—TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
TEMPERATURES				STATUS DISPLAY UINPUT			
AIR.T	Air Temperatures						
SAT	Supply Air Temperature	xxx.x	dF		SAT_DISP		
OAT	Outdoor Air Temperature	xxx.x	dF		OA_TEMP	forcible	forcible
SPT	Space Temperature	xxx.x	dF		SPACE_T	forcible	forcible
SPTO	Space Temperature Offset	xxx.x	dF		SPTO	forcible	forcible
RAT	Return Air Temperature	xxx.x	dF		RETURN_T	forcible	
REF.T	Refrigerant Temperatures						
SST.A	Sat. Suction Temp A	xxx.x	dF		SST_A		
SCT.A	Sat. Condenser Temp A	xxx.x	dF		SCT_A		
SST.B	Sat. Suction Temp B	xxx.x	dF		SST_B		
SCT.B	Sat. Condenser Temp B	xxx.x	dF		SCT_B		
SST.C	Sat. Suction Temp C	xxx.x	dF		SST_C		
SCT.C	Sat. Condenser Temp C	xxx.x	dF		SCT_C		

MODE — PRESSURES

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/SUB—TABLE	CCN POINT	CCN WRITE STATUS
PRESSURES				STATUS DISPLAY UINPUT		
SSP.A	Suction Pressure A	xxx.x	psig		SSP_A	
SCP.A	Condenser Pressure A	xxx.x	psig		SCP_A	
SSP.B	Suction Pressure B	xxx.x	psig		SSP_B	
SCP.B	Condenser Pressure B	xxx.x	psig		SCP_B	
SSP.C	Suction Pressure C	xxx.x	psig		SSP_C	
SCP.C	Condenser Pressure C	xxx.x	psig		SCP_C	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — SET POINTS

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB–TABLE	CCN POINT
SETPOINTS					**SETPOINT CONFIGURATION** *SET_PNT*	
OCSP	Occupied Cool Setpoint	55 to 80	°F	78		OCSP
UCSP	Unoccupied Cool Setpoint	65 to 95	°F	85		UCSP
OHSP	Occupied Heat Setpoint	55 to 80	°F	68		OHSP
UHSP	Unoccupied Heat Setpoint	40 to 80	°F	60		UHSP
GAP	Heat-Cool Setpoint Gap	2 to 10	^F	5		HCSP_GAP
STO.R	SPT Offset Range (+/-)	0 to 5	^F	5		SPTO_RNG
RH.SP	Space RH Occupied SP	30 to 100	%	50		SPRH_SP
RH.UN	Space RH Unoccupied SP	30 to 100	%	50		SPRH_USP
RH.DB	Space RH Deadband	2 to 20	%	8		SPRH_DB
RH.HB	Reheat Heat SP Deadband	-5 to 5	^F	2		RH_HSPDB
CA.LO	Circuit A Lockout Temp	0 to 100	°F	0		OATLCMPA
CB.LO	Circuit B Lockout Temp	0 to 100	°F	0: no Humidi-MiZer FIOP Humidi-MiZer FIOP: 40 (PG08-16) 0 (20-28, PM16)(03-07)		OATLCMPB
CC.LO	Circuit C Lockout Temp	0 to 100	°F	0		OATLCMPC
HT.LO	Heating Lockout Temp	40 to 125	°F	75		OATLHEAT
EH.LO	Econo Cool Hi Temp Limit	40 to 100	°F	65		OATLECLH
EL.LO	Econo Cool Lo Temp Limit	- 30 to 50	°F	0		OATLECLL
FC.LO	Free Cool Low Temp Limit	- 30 to 70	°F	50		OATLUEFC
LCSP	Low Cool SAT Setpoint	55 to 75	°F	55 (03-07) 65 (08-28)		LCSASP
HCSP	High Cool SAT Setpoint	50 to 70	°F	55		HCSASP

MODE — INPUTS

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB–TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
INPUTS				STATUS_DISPLAY UINPUT			
STAT	Thermostat Inputs						
Y1	Thermostat Y1 Input	On/Off			Y1	forcible	
Y2	Thermostat Y2 Input	On/Off			Y2	forcible	
W1	Thermostat W1 Input	On/Off			W1	forcible	
W2	Thermostat W2 Input	On/Off			W2	forcible	
G	Thermostat G Input	On/Off			G	forcible	
GEN.I	General Inputs						
FIL.S	Filter Status Switch	Dirty/Clean			FILTSTAT	forcible	
FAN.S	Fan Status Switch	On/Off			FAN_STAT	forcible	
FDWN	Fire Shutdown Switch	On/Off			FIREDOWN	forcible	
ENTH	Outdoor Enthalpy Switch	High/Low			ENTHALPY	forcible	
RM.OC	Remote Occupancy Switch	On/Off			REM_OCC	forcible	
HUM	Space Humidity Switch	High/Low			HUM_STAT	forcible	
CS.IN	Current Sensor Inputs						
CS.A1	Compressor A1 Feedback	On/Off			CS_A1		
CS.A2	Compressor A2 Feedback	On/Off			CS_A2		
CS.B1	Compressor B1 Feedback	On/Off			CS_B1		
CS.C1	Compressor C1 Feedback	On/Off			CS_C1		
AIR.Q	Air Quality Inputs						
IAQ.S	IAQ Level (switch)	High/Low			IAQIN	forcible	forcible
IAQ	IAQ Level (sensor)	xxxx	ppm		IAQ	forcible	forcible
OAQ	OAQ Level (sensor)	xxxx	ppm		OAQ	forcible	forcible
SP.RH	Space Humidity Sensor	xxx.x	%		SPRH	forcible	forcible

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — OUTPUTS

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB−TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
				STATUS DISPLAY			
OUTPUTS				UOUTPUT			
FANS	Fan Outputs						
IDF	Indoor Fan State	On/Off			IDFSTATE		
F.SPD	Commanded Fan Speed	xxx			FANSPEED		
OFC.1	Outdoor Fan 1 Relay	On/Off			OFC_1		
OFC.2	Outdoor Fan 2 Relay	On/Off			OFC_2		
OFC.3	Outdoor Fan 3 Relay	On/Off			OFC_3		
COOL	Cool Outputs						
CMP.A	Circuit A Compressor(s)	On/Off			COMP_A		
CMP.B	Compressors B	On/Off			COMP_B		
CMP.C	Compressors C	On/Off			COMP_C		
CCH	Crankcase Heat Relay	On/Off			CCH		
CRC	Cool->Reheat1 Control	On/Off			CRC		
RH2.A	Reheat2 Valve A	On/Off			RH2_A		
RH2.B	Reheat2 Valve BC	On/Off			RH2_B		
HEAT	Heat Outputs						
HT.1	Heat Stage 1 Relay	On/Off			HEAT_1		
HT.2	Heat Stage 2 Relay	On/Off			HEAT_2		
ECON	Economizer Outputs						
EC.CP	Econo Commanded Position	0 to 100	%		ECONOCMD	forcible	forcible
EC.AP	Econo Actual Position	0 to 100	%		ECONOPOS		
PE.1	Power Exhaust 1 Relay	On/Off			PE_1	forcible	
PE.2	Power Exhaust 2 Relay	On/Off			PE_2	forcible	
ALRM	Alarm Relay	On/Off			ALMOUT	forcible	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB—TABLE	CCN POINT	PAGE NO.
CONFIGURATION					SERVICE CONFIGURATION		14
DISP	Display Configuration				DISPLAY		14
METR	Metric Display	Off/On		Off		DISPUNIT	14
LANG	Language Selection	0=English 1=Spanish 2=French 3=Portuguese		0		LANGUAGE	14
PROT	Password Enable	Disable/Enable		Enable		PASS_EBL	14
PSWD	Service Password	0000 to 9999		1111		PASSWORD	14
TEST	Test Display LEDs	Off/On		Off	(display only, not in table)	DISPTEST	14
UNIT	Unit Configuration				UNIT		14
S.DLY	Startup Delay	10 to 600	sec	30		STARTDLY	14
U.CTL	Unit Control Type	2=Thermostat 3=Space Sensor		2		CTL_TYPE	14
T.CTL	Thermostat Control Type	0=Adaptive 1=1 Stage Y1 2=2 Stage Y1 3=Digital		0		STATTYPE	15
OC.FN	Fan On When Occupied	No/Yes		Yes		OCC_FAN	15
IDF.F	Shut Down on IDF Failure	No/Yes		Yes		FATALFAN	15
FN.SW	Fan Status Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		FANSTCFG	15
FL.SW	Filter Status Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		FILSTCFG	15
FS.SW	Fire Shutdown Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		SHTDNCFG	15
RM.SW	Remote Occupancy Switch	0=No Switch 1=Normal Open 2=Normal Closed		0		REMOCCFG	15
SAT.T	SAT Settling Time	10 to 900	sec	240		SAT_SET	15
RAT.S	RAT Sensor on SPTO Input	No/Yes		No		RAT_SPTO	15
RH.S	RH Sensor on OAQ Input	No/Yes		No		RH_OAQ	15
RH.SW	Space Humidity Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no Humidi-MiZer FIOP 1: Humidi-MiZer FIOP		HUMSTCFG	15
TCS.C	Temp Cmp Strt Cool Factr	0 to 60	mins	0		TCSTCOOL	15
TCS.H	Temp Cmp Strt Heat Factr	0 to 60	mins	0		TCSTHEAT	15

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
COOL	Cooling Configuration				COOL_CFG		15
N.CIR	Number of Circuits	0 to 3		1 (03-07) 2 (08-14) 3 (PG16) 2 (20-28, PM16)		NUM_CIRC	19
N.A	Compressors on Circuit A	1 to 2		1 (PG03-24) 1 (PM(16-28) 2 PG(28)		A_COMPS	19
MRT.C	Compressor Min On Time	120 to 999	sec	180		MIN_ON	19
MOT.C	Compressor Min Off Time	300 to 999	sec	300		MIN_OFF	19
RST.C	Runtime to Reset Strikes	120 to 999	sec	300		MIN_ON_S	37
C.DEC	Cool Stage Decrease Time	120 to 999	sec	300		STAGEDEC	18
C.INC	Cool Stage Increase Time	120 to 999	sec	450		STAGEINC	18
FOD.C	Fan-off Delay, Mech Cool	0 to 600	sec	60		COOL_FOD	17
ALM.N	Alert Each Strike	No/Yes		Yes		ALM_NOW	37
SAT	Supply Air Temperature						21
SA.PD	SAT Cool Demand (+) Level	0.5 to 10	^F	1		SAT_POS	
SA.ND	SAT Cool Demand (-) Level	-10 to -0.5	^F	-1		SAT_NEG	
SAT.U	Minimum SAT Upper Level	35.0 to 65.0	°F	60 (PG03-16) 58 (PG 20-24)(PM 16-28) 53 (PG 28)		SATMIN_H	
SAT.L	Minimum SAT Lower Level	35.0 to 65.0	°F	35 (03-07) 45 (08-14) 50 (PG16) 48 (20-28, PM16)		SATMIN_L	
SPT	Space Temperature						16
CL.PD	SPT Cool Demand (+) Level	0.5 to 5	^F	1		DEM_POS	
CL.ND	SPT Cool Demand (-) Level	-5 to -0.5	^F	-1		DEM_NEG	
C.LAG	Cool Thermal Lag Factor	0 to 5		1		COOL_LAG	
CIR.A	Circuit A						19
CA.LO	Circuit A Lockout Temp	0 to 100F	°F	0		OATLCMPA	
CS.A1	Current Sensing A1	Disable/Enable		Disable (1-phase) Enable (3-phase)		A1_SENSE	
CS.A2	Current Sensing A2	Disable/Enable		Disable (03-24) Enable (PG 28)		A2_SENSE	
A1.FN	Level 1 Fans A	0 to 7		no Humidi-MiZer FIOP: 1 (03-24)(PM 28) 5 (PG 28) Humidi-MiZer FIOP: 0 (PG03-16) 1 (20-28, PM16)		CIR_A_1	
A2.FN	Level 2 Fans A	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (08-20) 2 (24-28) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20, PM16) 2 (24-28)		CIR_A_2	
A3.FN	Level 3 Fans A	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (08-24)(PM 28) 7 (PG 28) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20-28, PM16)		CIR_A_3	
CIR.B	Circuit B						
CB.LO	Circuit B Lockout Temp	0 to 100F	°F	0: no Humidi-MiZer FIOP Humidi-MiZer FIOP: 40 (PG08-16) 0 (20-28, PM16)(03-07)		OATLCMPB	
CS.B1	Current Sensing B1	Disable/Enable		Disable (03-07) Enable (08-28)		B1_SENSE	
B1.FN	Level 1 Fans B	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 1 (PG08-16) 4 (20-28, PM16) Humidi-MiZer FIOP: 0 (PG03-16) 1 (20-28, PM16)		CIR_B_1	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
COOL (cont)	Cooling Configuration				COOL_CFG		15
B2.FN	Level 2 Fans B	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (PG08-16) 6 (20, PM16) 2 (24-28) Humidi-Mizer FIOP: 0 (03-14) 1 (PG16) 3 (20, PM16) 2 (24-28)		CIR_B_2	
B3.FN	Level 3 Fans B	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (PG08-16) 6 (20-28, PM16) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20-28, PM16)		CIR_B_3	
CIR.C	Circuit C						19
CC.LO	Circuit C Lockout Temp	0 to 100F	°F	0		OATLCMPC	
CS.C1	Current Sensing C1	Disable/Enable		Disable (03-14, 20-28) Enable (PG16)		C1_SENSE	
C1.FN	Level 1 Fans C	0-7		no Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 0 (20-28, PM16) Humidi-MiZer FIOP: 0 (PG03-16) 1 (20-28, PM16)		CIR_C_1	
C2.FN	Level 2 Fans C	0 to 7		no Humidi-MiZer FIOP: 0 (03-14) 3 (PG16) 0 (20-28, PM16) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 2 (20-28, PM16)		CIR_C_2	
C3.FN	Level 3 Fans C	0 to 7		no Humidi-MiZer FIOP: 0 (03-14) 3 (PG16) 0 (20-28, PM16) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20-28, PM16)		CIR_C_3	
SST	Low Suction Control						39
SST.O	Suction OK Temperature	10 to 50	°F	18		SSTOK	
SST.1	Low Suction - Level 1	10 to 50	°F	20		SSTLEV1	
SST.2	Low Suction - Level 2	5 to 50	°F	15		SSTLEV2	
SST.3	Low Suction - Level 3	0 to 50	°F	10		SSTLEV3	
CK.DL	Delay On Low SST Check	0 to 300	sec	0		SSTCKDLY	
OFC	Outdoor Fan Control						19
OFC.3	OFC3 Enable. CCH Disable	No/Yes		No (PG03-16) Yes (20-28, PM16)		OFC3_CTL	
0.MXP	Fan Lev0 Max Pressure	100 to 500	psig	200		LEV0MAXP	
1.MXP	Fan Lev1 Max Pressure	100 to 500	psig	400 (PG03-16) 450 (20-28, PM16)		LEV1MAXP	
2.MNP	Fan Lev2 Min Pressure	100 to 500	psig	150 (PG03-16) 200 (20-28, PM16)		LEV2MINP	
2.ON	Fan Lev2 On Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 55 (03-20) 45 (24-28) Humidi-MiZer FIOP: 68 (20, PM16) 61 (24-28)(PG03-16)		LEV2ON	
2.OFF	Fan Lev2 Off Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 45 (PG03-16) 50 (20, PM16) 40 (24-28) Humidi-MiZer FIOP: 57 (20-28, PM16)(PG03-16)		LEV2OFF	
2.MXP	Fan Lev2 Max Pressure	100 to 500	psig	400		LEV2MAXP	
3.MNP	Fan Lev3 Min Pressure	100 to 500	psig	250		LEV3MINP	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
COOL (cont)	Cooling Configuration				COOL_CFG		15
3.ON	Fan Lev3 On Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 65 Humidi-MiZer FIOP: 88 (20, PM16) 68 (24-28)(PG03-16)		LEV3ON	
3.OFF	Fan Lev3 Off Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 55 Humidi-MiZer FIOP: 78 (20, PM16) 62 (24-28)(PG03-16)		LEV3OFF	
HMZR	Humidimizer Config				HMZR_CFG		24
REHT	Humidimizer Equipped	No/Yes		No: no Humidi-MiZer FIOP Yes: Humidi-MiZer FIOP		REHEAT	24
R.DEC	Reheat2 Stage Decr. Time	0 to 999	secs	60		RSTAGDEC	28
R.INC	Reheat2 Stage Incr. Time	0 to 999	secs	300		RSTAGINC	28
RH.FN	Reheat Fan Control	No/Yes		No (03-14) Yes (16-28)		RHFANCTL	28
RF.LV	Reheat ODF Fan On Level	0 to 3		2 (03-20) 3 (24-28)		RHFANLEV	28
RF. ON	Reheat ODF Fan On Temp	0 to 100	°F	75 (PG03-16) 93 (PG20-24)(PM16-28) 85 (PG 28)		RHFANON	28
RF.OF	Reheat ODF Fan Off Temp	0 to 100	°F	70 (PG03-16) 83 (20, PM16) 88 (24)(PM 28) 80 (PG 28)		RHFANOFF	28
RA.LO	Reheat2 OAT Limit A	20 to 70	°F	40		OATLRH_A	28
RA.LP	Reheat2 SSP Lo Limit A	50 to 100	psig	80		RHSSPL_A	28
RA.HP	Reheat2 SSP Hi Limit A	50 to 100	psig	90		RHSSPH_A	28
RB.LO	Reheat2 OAT Limit B,C	20 to 70	°F	50		OATLRH_B	28
RB.LP	Reheat2 SSP Lo Limit B,C	50 to 100	psig	80		RHSSPL_B	28
RB.HP	Reheat2 SSP Hi Limit B,C	50 to 100	psig	90		RHSSPH_B	28
HEAT	Heating Configuration				HEAT_CFG		15
HT.TY	Type of Heat Installed	0=No Heat 1=Gas 2=Electric		0 (50 series with no electric heat) 1 (48 series) 2 (50 series with electric heat)		HEATTYPE	21
N.HTR	Number of Heat Stages	1 to 2		1 (48 series 1-phase, 50 series <15kW) 2 (48 series 3-phase, 50 series >=15kW)		NUM_HEAT	22
MRT.H	Heat Minimum On Time	60 to 999	sec	120		HMIN_ON	22
MOT.H	Heat Minimum Off Time	60 to 999	sec	120		HMIN_OFF	22
H.DEC	Heat Stage Decrease Time	120 to 999	sec	300		HSTAGDEC	21
H.INC	Heat Stage Increase Time	120 to 999	sec	450		HSTAGINC	21
FOD.E	Fan-off Delay, Elect Heat	10 to 600	sec	30		ELEC_FOD	17
FOD.G	Fan-off Delay, Gas Heat	45 to 600	sec	45		GAS_FOD	17
HT.LO	Heating Lockout Temp	40 to 125	°F	75		OATLHEAT	21
SAT							15
SAT.H	SAT Heat Mode Sensing	Disable/Enable		Disable		SAT_HEAT	16
SAM.L	Maximum SAT Lower Level	85 to 200	°F	140		SATMAX_L	
SAM.U	Maximum SAT Upper Level	85 to 200	°F	160		SATMAX_H	
SPT	Space Temperature						16
HT.PD	SPT Heat Demand (+) Level	0.5 to 5	^F	1		HDEM_POS	
HT.ND	SPT Heat Demand (-) Level	-5 to -0.5	^F	-1		HDEM_NEG	
H.LAG	Heat Thermal Lag Factor	0 to 5		1		HEAT_LAG	

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
ECON	Economizer Configuration				ECON_CFG		23
EC.EN	Economizer Installed	No/Yes		No: no FIOP Yes: FIOP		ECONO	23
E.CTL	Economizer Control Type	1=Dig/Position 2=Dig/Command 3=Analog Ctrl		1		ECON_CTL	14
EC.MN	Econo Minimum Position	0 to 100	%	30 0: ERV FIOP		ECONOMIN	23
EC.MX	Econo Cool Max Position	0 to 100	%	100		ECONOMAX	23
M.ANG	Min Actuator Ctrl Angle	75 to 90		88		MINANGLE	23
EH.LO	Econo Cool Hi Temp Limit	40 to 100	°F	65		OATLECLH	23
EL.LO	Econo Cool Lo Temp Limit	-30 to 50	°F	0		OATLECLL	23
DF.DB	Diff Dry Bulb Control	Disable/Enable		Disable		DIFFBULB	23
UEFC	Unoccupied Free Cooling	0=Disabled 1=Unoccpied 2=PreOccupancy		2		UEFC_CFG	23
FC.TM	Free Cool PreOcc Time	1 to 9999	mins	120		UEFCTIME	23
FC.LO	Free Cool Low Temp Limit	-30 to 70	°F	50		OATLUEFC	23
PE.EN	Power Exhaust Installed	No/Yes		No: no FIOP Yes: FIOP		PE_ENABL	24
PE.1	PE Stage1 Econo Position	0 to 100	%	40		PE1_POS	24
PE.2	PE Stage2 Econo Position	0 to 100	%	75		PE2_POS	24
EN.SW	Enthalpy Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		ENTHLCFG	10
E.TRV	Economizer Travel Time	5 to 300	secs	150		ECONOTRV	104
E.MXB	Bottom Stage Max Econo	0 to 100	%	50		ECONMAXB	104
E.MXM	Middle Stage Max Econo	0 to 100	%	35		ECONMAXM	104
E.MXT	Top Stage Max Econo	0 to 100	%	25 (PG03-16) 0 (20-28, PM16)		ECONMAXT	104
AIR.Q	Air Quality Config.				IAQ_CFG		14
IA.CF	IAQ Analog Input Config	0=No IAQ 1=DCV 2=Override IAQ 3=Ctrl Min Pos		0: no FIOP 1: FIOP		IAQANCFG	14
IA.FN	IAQ Analog Fan Config	0=Never 1=Occupied 2=Always		0		IAQANFAN	30
II.CF	IAQ Switch Input Config	0=No IAQ 1=DCV N/O 2=DCV N/C 3=Override N/O 4=Override N/C		0		IAQINCFG	30
II.FN	IAQ Switch Fan Config	0=Never 1=Occupied 2=Always		0		IAQINFAN	34
AQ.MN	Econo Min IAQ Position	0 to 100	%	10 0: ERV FIOP		IAQMINP	30
EC.MN	Econo Minimum Position	0 to 100	%	30 0: ERV FIOP		ECONOMIN	23
OVR.P	IAQ Override Position	0 to 100	%	100		IAQOVPOS	30
OA.CF	OAQ Analog Input Config	0=No OAQ 1=DCV 2=Lockout OAQ		0		OAQANCFG	30
OAQ.L	OAQ Lockout Limit	0 to 5000		600		OAQLOCK	30
AQD.L	AQ Differential Low	0 to 5000		100		DAQ_LOW	30
AQD.H	AQ Differential High	0 to 5000		700		DAQ_HIGH	30
DF.ON	Fan On AQ Differential	0 to 5000		600		DAQFNON	34
DF.OF	Fan Off AQ Differential	0 to 5000		200		DAQFNOFF	34
I.4M	IAQ Sensor Value at 4mA	0 to 5000		0		IAQ_4MA	30
I.20M	IAQ Sensor Value at 20mA	0 to 5000		2000		IAQ_20MA	30
O.4M	OAQ Sensor Value at 4mA	0 to 5000		0		OAQ_4MA	33
O.20M	OAQ Sensor Value at 20mA	0 to 5000		2000		OAQ_20MA	33
H.4M	RH Sensor Value at 4mA	0 to 50	%	0		RH_4MA	24
H.20M	RH Sensor Value at 20mA	60 to 100	%	100		RH_20MA	24

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
OAU	Outside Air Unit Config				OAU_CFG		12
OA.TY	Outdoor Air Unit Type	0=No OAU 1=ERV Module 2=Economizer 3=Pwr Exhaust 4=OA Monitor 5=100% OA Unit 6=EXv1 ERV		0: no FIOP 1: FIOP EXv2		OAU_TYPE	40
OA.FC	Outside Air Fan Curve	0 to 999		0: no FIOP 1: PG03-07 1ph low CFM ERV 2: PG03-07 3ph low CFM ERV 3: PG03-07 1ph high CFM ERV 4: PG03-07 3ph high CFM ERV 5: PG08-14 low CFM ERV 6: PG08-14 high CFM ERV 7: PM16-24 low CFM ERV 8: PM16-24 high CFM ERV 9: PM28 low CFM ERV 10: PM28 high CFM ERV		OAFANCRV	105
PE.FC	Exhaust Air Fan Curve	0 to 999		0: no FIOP 1: PG03-06 1ph low CFM ERV 2: PG03-07 3ph low CFM ERV 3: PG03-06 1ph high CFM ERV 4: PG03-07 3ph high CFM ERV 5: PG08-14 low CFM ERV 6: PG08-14 high CFM ERV 7: PM16-24 low CFM ERV 8: PM16-24 high CFM ERV 9: PM28 low CFM ERV 10: PM28 high CFM ERV		PEFANCRV	105
U.RUN	OAU Unoccupied Operation	No/Yes		NO		UNOCCRUN	105
OAU.F	Shut Down on Fan Failure	No/Yes		Yes		FATALOAU	105
M.WHL	Modulating Wheel Install	No/Yes		NO		MODWHEEL	105
OA.MN	Minimum Outside Air CFM	0 to 32000	CFM	375: PG03-07 low CFM ERV 800: PG03-07 high CFM ERV 1000: PG08-14 low CFM ERV 2500: PG08-14 high CFM ERV 3000: PM16-28 low CFM ERV 4000: PM16-24 high CFM ERV 5000: PM28 high CFM ERV		MINOACFM	95
DCV.M	Min DCV Outside Air CFM	0 to 32000	CFM	100: PG03-07 ERV 250: PG08-14 low CFM ERV 600: PG08-14 high CFM ERV 1000: PM16-24 low CFM ERV 1500: PM16-24 high CFM ERV, PM28 low CFM ERV 2000: PM28 high CFM ERV		MINDCVSP	95
PEX.C	Power Exhaust Control	0=Offset CFM 1=BP		0		PEX_CTL	105
PE.OF	Power Exhaust CFM Offset	-17000 to 17000	CFM	-200		EXOFFSET	95
BP.SP	Building Pressure Setpnt	-0.25 to 0.25	in H2O	0.05		OAU_BPSP	95
OA.TM	Outside Air Tempering	Disable/Enable		Disable		OATEMPER	95
TM.LO	OA Tempring Lockout Temp	0 to 80	°F	60		OATMPLOC	95
TM.SP	OA Tempring SAT Setpoint	35 to 80	°F	55		OATMPSPT	95
OAC.K	Outside Air CFM k Factor	0.8 to 1.2		1.0		OACFM_K	105
EXC.K	Exhaust Air CFM k Factor	0.8 to 1.2		1.0		EXCFM_K	105

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB–TABLE	CCN POINT	PAGE NO.
A.FAN	Adaptive Fan				AFAN_CFG		34
AF.EN	Adaptive Fan Operation	No/Yes		No		ADAPTFAN	34
FS.VN	Fan Speed - Ventilation	0 to 100	%	50		FSPDVENT	34
FS.AQ	Fan Speed - IAQ Override	0 to 100	%	50		FSPDAQOR	34
FS.E1	Fan Speed - Free Cool Lo	0 to 100	%	60		FSPDECO1	34
FS.E2	Fan Speed - Free Cool Hi	0 to 100	%	90		FSPDECO2	34
FS.CL	Fan Speed - Mech Cooling	60 to 100	%	100		FSPDCOOL	34
FS.HT	Fan Speed - Heating	65 to 100	%	100		FSPDHEAT	34
FS.RH	Fan Speed - Reheat2	65 to 100	%	100		FSPDREHT	34
ALM.O	Alarm Relay Config.				ALM_CFG		37
A.SPC	SPT/SPRH Sensor Failure	No/Yes		Yes		SPACE_AL	106
A.SRT	SAT/RAT Sensor Failure	No/Yes		Yes		SATRATAL	106
A.OAT	OAT Thermistor Failure	No/Yes		Yes		OAT_AL	106
A.CS	Current Sensor Failure	No/Yes		Yes		CS_AL	105
A.CMP	Compressor Failure	No/Yes		Yes		COMP_AL	106
A.CKT	Refrig Circuit Failure	No/Yes		Yes		CKT_AL	106
A.SSP	SSP Transducer Failure	No/Yes		Yes		SSP_AL	106
A.SCT	SCT Thermistor Failure	No/Yes		Yes		SCT_AL	106
A.FAN	Indoor Fan Failure	No/Yes		Yes		FAN_AL	106
A.FIL	Dirty Filter	No/Yes		Yes		FILT_AL	106
A.TST	Thermostat Failure	No/Yes		Yes		TSTAT_AL	106
A.ECO	Economizer Failure	No/Yes		Yes		ECON_AL	106
PID	PID Configurations				PID_CFG		37
EC.P	Economizer PID - kP	0.00 to 99.90		2.5		ECONO_P	106
EC.I	Economizer PID - kI	0.00 to 99.90		0.12		ECONO_I	106
EC.D	Economizer PID - kD	0.00 to 99.90		1		ECONO_D	106
EC.DT	Economizer PID - rate	10.00 to 180.00	secs	15		ECONO_DT	106
EC.DB	Economizer PID Deadband	0 to 25	%	3		ECONBAND	106
LK.P	Linkage Staging PID - kP	0.00 to 99.90		10		LINK_P	106
LK.I	Linkage Staging PID - kI	0.00 to 99.90		5		LINK_I	106
LK.D	Linkage Staging PID - kD	0.00 to 99.90		5		LINK_D	106
LK.DT	Linkage Staging PID - rate	10.00 to 180.00	secs	30		LINK_DT	106
(GENERIC = CCN only)					GENERICS		96
	POINT 01 Definition					Point_01	
	POINT 02 Definition					Point_02	
	POINT 03 Definition					Point_03	
	POINT 04 Definition					Point_04	
	POINT 05 Definition					Point_05	
	POINT 06 Definition					Point_06	
	POINT 07 Definition					Point_07	
	POINT 08 Definition					Point_08	
	POINT 09 Definition					Point_09	
	POINT 10 Definition					Point_10	
	POINT 11 Definition					Point_11	
	POINT 12 Definition					Point_12	
	POINT 13 Definition					Point_13	
	POINT 14 Definition					Point_14	
	POINT 15 Definition					Point_15	
	POINT 16 Definition					Point_16	
	POINT 17 Definition					Point_17	
	POINT 18 Definition					Point_18	
	POINT 19 Definition					Point_19	
	POINT 20 Definition					Point_20	
TRIM	Sensor Calibration				(CCN TRIM - see Maintenance Display)		5
SPT.C	Space Temp Calibration	-30 to 130	°F				52
SPT.T	Space Temp Trim	-30 to 30	^F	0			52
SAT.C	Supply Air Temp Calib.	-30 to 130	°F				52
SAT.T	Supply Air Temp Trim	-30 to 30	^F	0			15
RAT.C	Return Air Temp Calib.	-30 to 130	°F				106
RAT.T	Return Air Temp Trim	-30 to 30	^F	0			106
CCN	CCN Configuration				CCN CONFIGURATION 4850PGPM		17
CCN.A	CCN Element Number	1 to 239		1		CCNADD	35
CCN.B	CCN Bus Number	0 to 239		0		CCNBUS	35
BAUD	CCN Baud Rate	1=2400 2=4800 3=9600 4=19200 5=38400		3		CCNBAUDD	35

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB–TABLE	CCN POINT	PAGE NO.
BROD	CCN Broadcast Config.				BRODEFS		17
B.TIM	CCN Time/Date Broadcast	No/Yes		No		CCNBC	35
B.OAT	CCN OAT Broadcast	No/Yes		No		OATBC	35
B.GS	Global Schedule Broadcst	No/Yes		No		GSBC	17
B.ACK	CCN Broadcast Ack'er	No/Yes		No		CCNBCACK	36
SCH.O	CCN Schedule Overrides				SCHEDOVR		36
SCH.N	Schedule Number	0 = Always Occupied 1-64 = Local Schedule 65-99 = Global Schedule		0		SCHEDNUM	17
HOL.G	Accept Global Holidays	No/Yes		No		HOLIDAYT	36
OV.TL	Override Time Limit	0 to 4	hours	4		OTL	17
OV.EX	Timed Override Hours	0 to 4	hours			OVR_EXT	17
OV.SP	SPT Override Enabled	No/Yes		Yes		TIMEOVER	17
LDSH	CCN LOADSHED CONFIG.				LOADSHED		36
S.GRP	Loadshed Group Number	0 to 16		0		SHED_NUM	36
R.MXC	Redline Max Cool Stages	0 to 3		3		MAXCREDL	36
S.MXC	Loadshed Max Cool Stages	0 to 3		3		MAXCSHED	36
R.MXH	Redline Max Heat Stages	0 to 2		2		MAXHREDL	36
S.MXH	Loadshed Max Heat Stages	0 to 2		2		MAXHSHED	36

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — TIME CLOCK

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT
TIME CLOCK					CONFIGURATION	
TIME	Time of Day				TIME	
TIME	Hour and Minute	xx.xx	hh.mm			TIME
DATE	Current Date					
MNTH	Month of Year	January, February, ..., December				MOY
DOM	Day of Month	1 to 31				DOM
YEAR	Year	xxxx				YOCDISP
DAY	Day of Week	Monday, Tuesday, ..., Sunday				DOWDISP
DST	Daylight Savings Config.				BRODEFS (continued)	
STR.M	Start Month	January, February, ..., December		4		STARTM
STR.W	Start Week	1 to 5		1		STARTW
STR.D	Start Day	1 to 7		7		STARTD
M.ADD	Minutes to Add	0 to 90		60		MINADD
STP.M	Stop Month	January, February, ..., December		10		STOPM
STP.W	Stop Week	1 to 5		5		STOPW
STP.D	Stop Day	1 to 7		7		STOPD
M.SUB	Minutes to Subtract	0 to 90		60		MINSUB
SCH.L	Occupancy Schedule				(SCH.L = Display only)	
PER.x	Occupancy Period x					
OCC.x	Occupied From	00.00 to 23.59	hh.mm	00.00		PERxOCC
UNC.x	Occupied To	00.00 to 23.60	hh.mm	00.00		PERxUNC
MON.x	Monday in Period	Yes/No		No		PERxMON
TUE.x	Tuesday in Period	Yes/No		No		PERxTUE
WED.x	Wednesday in Period	Yes/No		No		PERxWED
THU.x	Thursday in Period	Yes/No		No		PERxTHU
FRI.x	Friday in Period	Yes/No		No		PERxFRI
SAT.x	Saturday in Period	Yes/No		No		PERxSAT
SUN.x	Sunday in Period	Yes/No		No		PERxSUN
HOL.x	Holiday in Period	Yes/No		No		PERxHOL
(repeat up to x=8 Periods)						
(OCCFECS = CCN only)					OCCDEFCS	
	Timed Override Hours	x	hours			OVR-EXT
	Period x DOW (MTWTFSSH)	xxxxxxxx		00000000		DOWx
	Occupied From	00.00 to 24.00	hh.mm	00.00		OCCTODx
	Occupied To	00.00 to 24.00	hh.mm	00.00		UNOCTODx (repeat up to x=8 Periods)
HOL.L	Holiday Schedule				HOLIDAY	
HOL.x	Holiday x				HOLDYxxS	
MON.x	Holiday Start Month	1 to 12 = January to December		0		HOLMONxx
DAY.x	Holiday Start Day	1 to 31		0		HOLDAYxx
LEN.x	Holiday Duration (days)	1 to 99		0		HOLLENxx
(repeat up to x=9 Holidays)						(repeat up to xx=30 Holidays)

CCN ONLY TABLES

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT
(ALARMDEF = CCN only)					ALARMDEF	
	Alarm Routing Control	00000000 to 11111111		11000000		ALRM_CNT
	Equipment Priority	0 to 7		5		EQP_TYPE
	Comm Failure Retry Time	1 to 240	min	10		RETRY_TM
	Re−Alarm Time	1 to 255	min	180		RE−ALARM
	Alarm System Name	up to 8 alphanum		4850PGPM		ALRM_NAM
(CTLRID = CCN only)					CTLR−ID	
	Device Name:	4850PGPM				
	Description:	text string				
	Location:	text string				
	Software Part Number:	CESR131320−XX−XX				
	Model Number:					
	Serial Number:					
	Reference Number:					

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — OPERATING MODES

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB−TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
OPERATING MODES				MAINTENANCE			
MODE	Control Modes			MODES			
SYS	Unit operation disabled				SYS_MODE_TEXT1		
	Unit operation enabled				SYS_MODE_TEXT2 (table only)		
	Service test enabled				SYS_MODE_TEXT3 (table only)		
HVAC	HVAC Operation Disabled				HVACMODE_TEXT_1		
	Ventilation (fan-only)				HVACMODE_TEXT_2 (table only)		
	Cooling				HVACMODE_TEXT_3 (table only)		
	Free Cooling						
	Unoccupied Free Cooling						
	Reheat1						
	Reheat2						
	Reheat1 / Reheat2						
	Heating						
HV.DN	Remote HVAC Mode Disable	No/Yes			HVACDOWN	forcible	
EFF.C	Cool Setpoint In Effect	xx.x	°F		CSP_EFF		
EFF.H	Heat Setpoint In Effect	xx.x	°F		HSP_EFF		
OCC	Currently Occupied	No/Yes			OCCUPIED	forcible	forcible
T.OVR	Timed Override in Effect	No/Yes			MODETOVR		
LINK	Linkage Active	No/Yes			MODELINK		
D.LMT	Demand Limit In Effect	No/Yes			MODEDMDL		
C.LOC	Compressor OAT Lockout	No/Yes			COMPLOCK		
H.LOC	Heat OAT Lockout	No/Yes			HEATLOCK		
OK.EC	OK to Use Economizer?	No/Yes			ECONCOOL		
COOL	Cool Mode Diagnostic			COOLDIAG			
COOL	In Cooling Mode?	No/Yes			IN_COOL		
OK.CL	OK to Select Cool Mode?	No/Yes			OKTOCOOL		
MS.TG	Mode Select Timeguard	xxx	secs		COOLMSTG		
OK.EC	OK to Use Economizer?	No/Yes			ECONCOOL		
OK.MC	OK to Use Compressors?	No/Yes			MECHCOOL		
C.LOC	Compressor OAT Lockout	No/Yes			COMPLOCK		
CA.LO	Circuit A Lockout Temp	xxx	°F		OATLCMPA		
CB.LO	Circuit B Lockout Temp	xxx	°F		OATLCMPB		
CC.LO	Circuit C Lockout Temp	xxx	°F		OATLCMPC		
IDF	Indoor Fan State	Off/On			IDFSTATE		
F.SPD	Commanded Fan Speed	xxx	%		FANSPEED		
AVL.C	Available Cooling Stages	x			AVLCSTGS		
REQ.C	Requested Cooling Stages	x			REQCSTGS		
LMT.C	Max Cool Stage In Effect	x			CSTGLIMT		
ACT.C	Actual Cooling Stages	x			ACTCSTGS		
CMP.A	Circuit A Compressor(s)	Off/On			COMP_A		
CMP.B	Circuit B Compressor	Off/On			COMP_B		
CMP.C	Circuit C Compressor	Off/On			COMP_C		
ST.A	Circuit A Strikes	x			ASTRIKES		
ST.B	Circuit B Strikes	x			BSTRIKES		
ST.C	Circuit C Strikes	x			CSTRIKES		
F.LEV	Outdoor Fan Level	x			FANLEV		
SAT	Supply Air Temperature						
SAT	Supply Air Temperature	xxx.x	°F		SAT_DISP		
SA.DM	Supply Air Temp Demand	xxx.x	^F		SAT_DMD		
SA.PD	SAT Cool Demand (+) Level	xx.x	^F		SAT_POS		
SA.ND	SAT Cool Demand (-) Level	xx.x	^F		SAT_NEG		
SAT.U	Minimum SAT Upper Level	xx.x	°F		SATMIN_H		
SAT.L	Minimum SAT Lower Level	xx.x	°F		SATMIN_L		
SA.TR	Supply Air d/dt (F/min)	xxxx.x			SATTREND		
SA.DR	SAT Delta Reference Temp	xxx.x	°F		SAT_REF		
SPT	Space Temperature						
SPT	Space Temperature	xxx.x	°F		SPACE_T	forcible	forcible
DMD.C	Cooling Demand	xxx.x	^F		COOL_DMD		
TRD.C	Cool Demand d/dt (F/min)	xxx.x			CLDTREND		
CL.PD	SPT Cool Demand (+) Level	xx.x	^F		DEM_POS		
CL.ND	SPT Cool Demand (-) Level	xx.x	^F		DEM_NEG		
C.LAG	Cool Thermal Lag Factor	x.x			COOL_LAG		
HMZR	Humidimizer						
REHT	Humidimizer Equipped	No/Yes			REHEAT		
HUM	Space Humidity Switch	Low/High			HUM_STAT	forcible	
SP.RH	Space Humidity Sensor	xxx.x	%		SPRH	forcible	forcible
R.LO.A	Reheat2 OAT Lockout A	No/Yes			RHALOCK		
RA.LO	Reheat2 OAT Limit A	xx	°F		OATLRH_A		
R.LP.A	Reheat2 SSP Override A	No/Yes			RHALPOV		
R.LO.B	Reheat2 OAT Lockout B,C	No/Yes			RHBLOCK		
RB.LO	Reheat2 OAT Limit B,C	xx	°F		OATLRH_B		
R.LP.B	Reheat2 SSP Override B,C	No/Yes			RHBLPOV		
AVL.R	Available Reheat2 Stages	x			AVLRSTGS		
REQ.R	Requested Reheat2 Stages	x			REQRSTGS		
ACT.R	Actual Reheat2 Stages	x			ACTRSTGS		
CRC	Cool->Reheat1 Control	Off/On			CRC		
RH2.A	Reheat2 Valve A	Off/On			RH2_A		
RH2.B	Reheat2 Valve B,C	Off/On			RH2_B		

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — OPERATING MODES (cont)

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB–TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
HEAT	Heat Mode Diagnostic			HEATDIAG			
HEAT	In Heating Mode?	No/Yes			IN_HEAT		
OK.HT	OK to Select Heat Mode?	No/Yes			OKTOHEAT		
MS.TG	Mode Select Timeguard	xxx	secs		HEATMSTG		
H.LOC	Heat OAT Lockout	No/Yes			HEATLOCK		
HT.LO	Heating Lockout Temp	xxx	°F		OATLHEAT		
IDF	Indoor Fan State	Off/On			IDFSTATE		
F.SPD	Commanded Fan Speed	xxx	%		FANSPEED		
AVL.H	Available Heating Stages	x			AVLHSTGS		
REQ.H	Requested Heating Stages	x			REQHSTGS		
LMT.H	Max Heat Stage In Effect	x			HSTGLIMT		
ACT.H	Actual Heating Stages	x			ACTHSTGS		
HT.1	Heat Stage 1 Relay	Off/On			HEAT_1		
HT.2	Heat Stage 2 Relay	Off/On			HEAT_2		
SAT	Supply Air Temperature						
SAT.H	SAT Heat Mode Sensing	Disable/ Enable			SAT_HEAT		
SAT	Supply Air Temperature	xxx.x	°F		SAT_DISP		
SAM.L	Maximum SAT Lower Level	xxx.x	°F		SATMAX_L		
SAM.U	Maximum SAT Upper Level	xxx.x	°F		SATMAX_H		
SPT	Space Temperature						
SPT	Space Temperature	xxx.x	°F		SPACE_T	forcible	forcible
DMD.H	Heating Demand	xxx.x	^F		HEAT_DMD		
TRD.H	Heat Demand d/dt (F/min)	xxx.x			HTDTREND		
HT.PD	SPT Heat Demand (+) Level	xx.x	^F		HDEM_POS		
HT.ND	SPT Heat Demand (-) Level	xx.x	^F		HDEM_NEG		
H.LAG	Heat Thermal Lag Factor	x.x			HEAT_LAG		
ECON	Economizer Diagnostic			ECONDIAG			
EC.EN	Economizer Installed	No/Yes			ECONO		
OK.EC	OK to Use Economizer?	No/Yes			ECONCOOL		
OCC	Currently Occupied	No/Yes			OCCUPIED	forcible	forcible
IDF	Indoor Fan State	Off/On			IDFSTATE		
F.SPD	Commanded Fan Speed	xxx	%		FANSPEED		
COOL	In Cooling Mode?	No/Yes			IN_COOL		
OAT	Outdoor Air Temperature	xxx.x	°F		OA_TEMP	forcible	forcible
RAT	Return Air Temperature	xxx.x	°F		RETURN_T	forcible	forcible
E.LOC	Econo Cool OAT Lockout	No/Yes			ECONLOCK		
D.LOC	Econo Diff Dbulb Lockout	No/Yes			DFDBLOCK		
EH.LO	Econo Cool Hi Temp Limit	xxx	°F		OATLECLH		
EL.LO	Econo Cool Lo Temp Limit	xxx	°F		OATLECLL		
FC.LO	Free Cool Low Temp Limit	xxx	°F		OATLUEFC		
EN.LO	Econo Cool Enth Lockout	No/Yes			ENTHLOCK		
EC.MX	Econo Cool Max Position	xxx	%		ECONOMAX		
EC.MN	Econo Minimum Position	xxx	%		ECONOMIN		
AQ.DV	IAQ DCV Mode	No/Yes			IN_IAQDV		
AQ.MN	Econo Min IAQ Position	xxx	%		IAQMINP		
AQ.OV	IAQ Override Mode	No/Yes			IN_IAQOV		
OVR.P	IAQ Override Position	xxx	%		IAQOVPOS		
AQ.LO	OAQ Lockout Mode	No/Yes			IN_OAQLO		
OAQ.L	OAQ Lockout Limit	xxxx			OAQLOCK		
LP.OV	Lo Refrig Press Override	No/Yes			IN_LPOV		
EC.CP	Econo Commanded Position	xxx	%		ECONOCMD	forcible	forcible
EC.AP	Econo Actual Position	xxx	%		ECONOPOS		
EC.MP	Min Position in Effect	xxx	%		MIN_POS	forcible	forcible
C.ANG	Actuator Control Angle	xx.x			CTLANGLE		
E.CAL	Economizer Calibrating	No/Yes			ECOINCAL		
OAU	Outside Air Unit Diagnostic			OAU_DIAG			
OA.RN	OAU System Run State	1=AUTO 2=OFF 3=TEST			OAU_RUN		
OA.OP	OAU Operating Mode	0=Off 1=ERV (DCV) 2=Free Cooling 3=OA Tempering 4=Defrost 5=Test 6=Ext. Mode 1 7=Ext. Mode 2 8=Ext. Mode 3			OAU_MODE		
2P.DM	OAU 2-position Damper	Close/ Open			OAUDMPR		
WHL	OAU Wheel Speed	xxx	%		OAUWHEEL		
LAT	OAU Leaving Air Temp	xxx.x	°F		OAU_LAT		
EXAT	OAU Exhaust Air Temp	xxx.x	°F		OAU_EXAT		
OA.MN	Minimum Outside Air CFM	xxxxx	CFM		MINOACFM		
DCV.M	Min DCV Outside Air CFM	xxxxx	CFM		MINDCVSP		
OA.FS	OAU OA Fan Speed	xxx	%		OAFANSPD		
A.OA	Actual Outside Air CFM	xxxxx	CFM		ACTOACFM		
C.OA	Command Outside Air CFM	xxxxx	CFM		CMDOACFM		
PE.OF	Power Exhaust CFM Offset	xxxxx	CFM		EXOFFSET		

APPENDIX A — LOCAL DISPLAY AND CCN TABLES (CONT)

MODE — OPERATING MODES (cont)

ITEM	EXPANSION	RANGE	UNITS	CCN TABLE/ SUB—TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
OAU (cont)	Outside Air Unit Diagnostic			OAU_DIAG			
EX.FS	OAU Exhaust Fan Speed	xxx	%		OAUPESPD		
A.EX	Actual Exhaust Air CFM	xxxxx	CFM		ACTEXCFM		
C.EX	Command Exhaust Air CFM	xxxxx	CFM		CMDEXCFM		
BP.SP	Building Pressure Setpnt	x.xx	in H2O		OAU_BPSP		
BP	Building Pressure	x.xx	in H2O		OAU_BP		
TM.LO	OA Tempring Lockout Temp	xx	°F		OATMPLOC		
TM.SP	OA Tempring SAT Setpoint	xx	°F		OATMPSPT		
OA.HT	OAU Tempering Heater	xxx	%		OAHEATER		
ALM.1	OAU Motor Failure Alarm	Off/On			OAUALRM1		
ALM.2	OAU Dirty Filter Alarm	Off/On			OAUALRM2		
ALM.3	OA Low CFM Alarm	Off/On			OAUALRM3		
ALM.4	OAU Alarm	Off/On			OAUALRM4		
DMD.L	DEMAND LIMITING			DMDL			
D.LMT	Demand Limit In Effect	No/Yes			MODEDMDL		
LMT.C	Max Cool Stage In Effect	x			CSTGLIMT		
LMT.H	Max Heat Stage In Effect	x			HSTGLIMT		
REDL	Redline Activated	No/Yes			MODEREDL		
SHED	Loadshed Activated	No/Yes			MODESHED		
MAX.C	Max Allowed Cool Stages	x			MAXCSTGS		
MAX.H	Max Allowed Heat Stages	x			MAXHSTGS		
(Display TRIM - see Configuration)	Sensor Calibration			TRIM			
	Space Temp Calibration	-30 to 130	°F		SPT_CAL	forcible	
	Space Temp Trim	-30 to 30	^F		SPT_OFF	forcible	
	Supply Air Temp Calib.	-30 to 130	°F		SAT_CAL	forcible	
	Supply Air Temp Trim	-30 to 30	^F		SAT_OFF	forcible	
	Return Air Temp Calib.	-30 to 130	°F		RAT_CAL	forcible	
	Return Air Temp Trim	-30 to 30	^F		RAT_OFF	forcible	
(LINKDATA = CCN only)	CCN - Linkage			LINKDATA			
	Supervisory Element #	xxx			SUPE-ADR		
	Supervisory Bus	xxx			SUPE-BUS		
	Supervisory Block Number	xxx			BLOCKNUM		
	Average Occup. Heat Stp.	xxxx.x	°F		AOHS		
	Average Occup. Cool Stp.	xxxx.x	°F		AOCS		
	Average Unocc. Heat Stp.	xxxx.x	°F		AUHS		
	Average Unocc. Cool Stp.	xxxx.x	°F		AUCS		
	Average Zone Temperature	xxxx.x	°F		AZT		
	Average Occup. Zone Temp	xxxx.x	°F		AOZT		
	Linkage System Occupied?	No/Yes			LOCC		
	Next Occupied Day	"Mon", "Tue", ... , "Sun"	3-char text		LNEXTOCD		
	Next Occupied Time	xx:xx	hh:mm		LNEXTOCC	forcible	
	Next Unoccupied Day	"Mon", "Tue", ... , "Sun"	3-char text		LNEXTUOD		
	Next Unoccupied Time	xx:xx	hh:mm		LNEXTUNC	forcible	
	Last Unoccupied Day	"Mon", "Tue", ... , "Sun"	3-char text		LLASTUOD		
	Last Unoccupied Time	xx:xx	hh:mm		LLASTUNC	forcible	
(OCCDEFM = CCN only)	Occupancy Supervisory			OCCDEFM			
	Current Mode (1=Occup)	0,1			MODE		
	Current Occup Period #	0 to 8			PER_NO		
	Time-Override in Effect	No/Yes			OVERLAST		
	Time-Override Duration	0 to 4	hours		OVR_HRS		
	Current Occupied Tiime	xx.xx	hh:mm		STRTTIME		
	Current Unoccupied Time	xx.xx	hh:mm		ENDTIME		
	Next Occupied Day				NXTOCDAY		
	Next Occupied Time	xx.xx	hh:mm		NXTOCTIM		
	Next Unoccupied Day				NXTUNDAY		
	Next Unoccupied Time	xx.xx	hh:mm		NXTUNTIM		
	Previous Unoccupied Day				PRVUNDAY		
	Previous Unoccupied Time	xx.xx	hh.mm		PRVUNTIM		

MODE — ALARMS

ITEM	EXPANSION	RANGE	DEFAULT	CCN TABLE/ SUB—TABLE	CCN POINT	CCN WRITE STATUS	DISPLAY WRITE STATUS
ALARMS				MAINTENANCE DISPLAY ALARMS			
R.CUR	Reset All Current Alarms	Yes/No	No		ALRESET	forcible	forcible
R.HIS	Reset Alarm History	Yes/No	No		ALHISCLR	forcible	forcible
CURR	Currently Active Alarms						
alarm#	text string				ALARM01C – ALARM25C		
(repeat up to 25 alarms)							
HIST	Alarm History			ALARM HISTORY			
alarm#	alarm#–mm/dd/yy–hh.mm–text string						
(repeat up to 20 alarms)							

APPENDIX B — CONTROL MODES WITH Humidi–MiZer™ SYSTEM AND ECONOMIZER

Thermostat input shown for cooling demand (versus temperature sensor and set point). Humidistat input shown for dehumidification demand (versus relative humidity sensor and set point). Economizer cooling availability is dependent on outdoor temperature or enthalpy.

Circuit Subcooling mode = REHEAT 1

Circuit HGRH mode = hot gas reheat = REHEAT 2

Circuit ON mode = normal cooling

Thermostat Control type configuration = 0 = Adaptive, or Unit Control Type configuration = 3 = Space Temperature, for Dual-circuit and Tri-Circuit units results in added staging timers and flex between 1-stage Y1 and 2-stage Y1.

SINGLE-CIRCUIT UNITS
(Thermostat Control Type configuration is ignored)

ECONO AVAILABLE?	Y1	Y2	HUMIDISTAT	CIRCUIT A	ECONOMIZER	
NO	OFF	OFF	LOW	OFF	Min. Position	(Econo closed if fan off)
NO	OFF	OFF	HIGH	HGRH	Min. Position	
NO	ON	OFF	HIGH	Subcooling	Min. Position	
NO	OFF	ON	HIGH	Subcooling	Min. Position	alarm T411: Y2 without Y1
NO	ON	ON	HIGH	Subcooling	Min. Position	no alarm
NO	ON	OFF	LOW	ON	Min. Position	
NO	OFF	ON	LOW	ON	Min. Position	alarm T411: Y2 without Y1
NO	ON	ON	LOW	ON	Min. Position	no alarm
YES	OFF	OFF	LOW	OFF	Min. Position	(Econo closed if fan off)
YES	OFF	OFF	HIGH	HGRH	Min. Position	
YES	ON	OFF	HIGH	Subcooling	Min. Position	
YES	OFF	ON	HIGH	Subcooling	Min. Position	alarm T411: Y2 without Y1
YES	ON	ON	HIGH	Subcooling	Min. Position	no alarm
YES	ON	OFF	LOW	OFF or ON	Cooling	
YES	OFF	ON	LOW	OFF or ON	Cooling	alarm T411: Y2 without Y1
YES	ON	ON	LOW	OFF or ON	Cooling	no alarm

DUAL CIRCUIT UNITS
1-Stage Y1 (Thermostat Control Type configuration = 1)
and 2-Stage Y1 (Thermostat Control Type configuration = 2)

ECONO AVAILABLE?	Y1	Y2	HUMIDISTAT	CIRCUIT A	CIRCUIT B	ECONOMIZER	
NO	OFF	OFF	LOW	OFF	OFF	Min. Position	(Econo closed if fan off)
NO	OFF	OFF	HIGH	HGRH	HGRH	Min. Position	
NO	ON	OFF	HIGH	Subcooling	HGRH	Min. Position	
NO	OFF	ON	HIGH	Subcooling	Subcooling	Min. Position	alarm T411: Y2 without Y1
NO	ON	ON	HIGH	Subcooling	Subcooling	Min. Position	
NO	ON	OFF	LOW	ON	OFF	Min. Position	
NO	OFF	ON	LOW	ON	ON	Min. Position	alarm T411: Y2 without Y1
NO	ON	ON	LOW	ON	ON	Min. Position	
YES	OFF	OFF	LOW	OFF	OFF	Min. Position	(Econo closed if fan off)
YES	OFF	OFF	HIGH	HGRH	HGRH	Min. Position	
YES	ON	OFF	HIGH	Subcooling	HGRH	Min. Position	
YES	OFF	ON	HIGH	Subcooling	Subcooling	Min. Position	alarm T411: Y2 without Y1
YES	ON	ON	HIGH	Subcooling	Subcooling	Min. Position	
YES	ON	OFF	LOW	OFF or ON	OFF	Cooling	
YES	OFF	ON	LOW	OFF or ON	OFF or ON	Cooling	alarm T411: Y2 without Y1
YES	ON	ON	LOW	OFF or ON	OFF or ON	Cooling	

DUAL-CIRCUIT UNITS
Digital (Thermostat Control Type configuration = 3)

ECONO AVAILABLE?	Y1	Y2	HUMIDISTAT	CIRCUIT A	CIRCUIT B	ECONOMIZER	
NO	OFF	OFF	LOW	OFF	OFF	Min. Position	(Econo closed if fan off)
NO	OFF	OFF	HIGH	HGRH	OFF	Min. Position	
NO	ON	OFF	HIGH	HGRH	HGRH	Min. Position	
NO	OFF	ON	HIGH	Subcooling	HGRH	Min. Position	
NO	ON	ON	HIGH	Subcooling	Subcooling	Min. Position	
NO	ON	OFF	LOW	ON	OFF	Min. Position	
NO	OFF	ON	LOW	ON	ON	Min. Position	
NO	ON	ON	LOW	ON	ON	Min. Position	
YES	OFF	OFF	LOW	OFF	OFF	Min. Position	(Econo closed if fan off)
YES	OFF	OFF	HIGH	HGRH	OFF	Min. Position	
YES	ON	OFF	HIGH	HGRH	HGRH	Min. Position	
YES	OFF	ON	HIGH	Subcooling	HGRH	Min. Position	
YES	ON	ON	HIGH	Subcooling	Subcooling	Min. Position	
YES	ON	OFF	LOW	OFF or ON	OFF	Cooling	
YES	OFF	ON	LOW	OFF or ON	OFF or ON	Cooling	
YES	ON	ON	LOW	OFF or ON	OFF or ON	Cooling	

APPENDIX C — START–UP DATA

Fan Performance — 48PGD03 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	407	0.05	551	0.10	663	0.15	759	0.21	843	0.27
650	413	0.06	555	0.11	667	0.17	763	0.22	847	0.29
700	419	0.06	560	0.12	671	0.18	766	0.24	851	0.30
750	425	0.07	565	0.13	676	0.19	770	0.25	854	0.32
800	433	0.08	570	0.14	680	0.20	774	0.27	858	0.34
850	440	0.08	575	0.15	685	0.22	779	0.29	862	0.36
900	448	0.09	581	0.16	690	0.23	783	0.30	866	0.38
950	456	0.10	587	0.17	695	0.24	788	0.32	871	0.40
1000	465	0.11	594	0.18	700	0.26	792	0.34	875	0.42

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	920	0.33	990	0.40	1056	0.47	1117	0.54	1176	0.62
650	923	0.35	994	0.42	1059	0.49	1121	0.57	1179	0.65
700	927	0.37	997	0.44	1063	0.52	1124	0.60	1182	0.68
750	931	0.39	1001	0.47	1066	0.54	1128	0.62	1186	0.71
800	934	0.41	1004	0.49	1070	0.57	1131	0.65	1189	0.74
850	938	0.44	1008	0.52	1073	0.60	1135	0.68	1193	0.77
900	942	0.46	1012	0.54	1077	0.63	1138	0.71	1196	0.80
950	946	0.48	1016	0.57	1081	0.65	1142	0.74	1200	0.83
1000	950	0.51	1020	0.59	1085	0.68	1146	0.78	1204	0.87

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 656 to 1001 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD04 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	448	0.09	581	0.16	690	0.23	783	0.30	866	0.38
950	456	0.10	587	0.17	695	0.24	788	0.32	871	0.40
1000	465	0.11	594	0.18	700	0.26	792	0.34	875	0.42
1050	474	0.12	600	0.20	706	0.27	797	0.36	880	0.44
1100	483	0.13	607	0.21	711	0.29	803	0.38	884	0.46
1150	493	0.14	614	0.22	717	0.31	808	0.40	889	0.49
1200	503	0.16	622	0.24	724	0.33	813	0.42	894	0.51
1250	513	0.17	630	0.25	730	0.34	819	0.44	899	0.54
1300	524	0.19	638	0.27	737	0.36	825	0.46	905	0.56
1350	535	0.20	646	0.29	744	0.38	831	0.48	910	0.59
1400	546	0.22	655	0.31	751	0.41	837	0.51	916	0.61
1450	557	0.24	664	0.33	759	0.43	844	0.53	922	0.64
1500	569	0.25	673	0.35	766	0.45	851	0.56	928	0.67

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	942	0.46	1012	0.54	1077	0.63	1138	0.71	1196	0.80
950	946	0.48	1016	0.57	1081	0.65	1142	0.74	1200	0.83
1000	950	0.51	1020	0.59	1085	0.68	1146	0.78	—	—
1050	955	0.53	1024	0.62	1089	0.71	1150	0.81	—	—
1100	959	0.56	1028	0.65	1093	0.74	1154	0.84	—	—
1150	963	0.58	1032	0.68	1097	0.78	—	—	—	—
1200	968	0.61	1037	0.71	1101	0.81	—	—	—	—
1250	973	0.64	1041	0.74	1105	0.84	—	—	—	—
1300	978	0.66	1046	0.77	—	—	—	—	—	—
1350	983	0.69	1051	0.80	—	—	—	—	—	—
1400	988	0.72	1056	0.83	—	—	—	—	—	—
1450	994	0.75	—	—	—	—	—	—	—	—
1500	1000	0.79	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE04 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	452	0.09	584	0.16	693	0.23	786	0.31	870	0.38
950	460	0.10	590	0.17	698	0.25	791	0.32	874	0.40
1000	469	0.11	597	0.18	703	0.26	796	0.34	878	0.42
1050	479	0.12	604	0.20	709	0.28	801	0.36	883	0.45
1100	488	0.13	611	0.21	715	0.29	806	0.38	888	0.47
1150	498	0.15	619	0.23	721	0.31	812	0.40	893	0.49
1200	509	0.16	627	0.24	728	0.33	817	0.42	898	0.52
1250	519	0.17	635	0.26	735	0.35	823	0.44	903	0.54
1300	530	0.19	643	0.28	742	0.37	829	0.47	909	0.57
1350	542	0.21	652	0.29	749	0.39	836	0.49	915	0.59
1400	553	0.22	661	0.31	756	0.41	842	0.51	921	0.62
1450	565	0.24	670	0.33	764	0.44	849	0.54	927	0.65
1500	577	0.26	680	0.36	772	0.46	856	0.57	933	0.68

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	945	0.46	1016	0.55	1081	0.63	1143	0.72	1201	0.81
950	950	0.49	1019	0.57	1085	0.66	1146	0.75	1204	0.84
1000	954	0.51	1023	0.60	1089	0.69	1150	0.78	—	—
1050	958	0.53	1028	0.63	1093	0.72	1154	0.81	—	—
1100	963	0.56	1032	0.65	1097	0.75	1158	0.85	—	—
1150	967	0.59	1036	0.68	1101	0.78	—	—	—	—
1200	972	0.61	1041	0.71	1105	0.81	—	—	—	—
1250	977	0.64	1045	0.74	1110	0.85	—	—	—	—
1300	982	0.67	1050	0.78	—	—	—	—	—	—
1350	987	0.70	1055	0.81	—	—	—	—	—	—
1400	993	0.73	1060	0.84	—	—	—	—	—	—
1450	999	0.76	—	—	—	—	—	—	—	—
1500	1004	0.79	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF04 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	459	0.10	590	0.16	698	0.24	792	0.31	876	0.39
950	468	0.11	597	0.18	704	0.25	797	0.33	881	0.41
1000	477	0.12	604	0.19	710	0.27	802	0.35	885	0.43
1050	488	0.13	611	0.20	716	0.28	807	0.37	890	0.45
1100	498	0.14	619	0.22	722	0.30	813	0.39	895	0.48
1150	509	0.15	627	0.23	729	0.32	819	0.41	900	0.50
1200	520	0.17	636	0.25	736	0.34	825	0.43	906	0.53
1250	531	0.18	644	0.27	743	0.36	831	0.45	911	0.55
1300	543	0.20	653	0.28	751	0.38	838	0.48	917	0.58
1350	555	0.21	663	0.30	759	0.40	845	0.50	923	0.61
1400	567	0.23	672	0.32	767	0.42	852	0.53	930	0.63
1450	579	0.25	682	0.35	775	0.45	859	0.55	936	0.66
1500	592	0.27	692	0.37	784	0.47	867	0.58	943	0.69

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	953	0.47	1023	0.56	1089	0.64	1151	0.73	1210	0.82
950	957	0.49	1027	0.58	1093	0.67	1155	0.76	—	—
1000	961	0.52	1031	0.61	1097	0.70	1159	0.80	—	—
1050	965	0.54	1035	0.64	1101	0.73	1162	0.83	—	—
1100	970	0.57	1040	0.67	1105	0.76	—	—	—	—
1150	975	0.60	1044	0.69	1109	0.80	—	—	—	—
1200	980	0.62	1049	0.73	1114	0.83	—	—	—	—
1250	985	0.65	1054	0.76	—	—	—	—	—	—
1300	990	0.68	1059	0.79	—	—	—	—	—	—
1350	996	0.71	1064	0.82	—	—	—	—	—	—
1400	1002	0.74	—	—	—	—	—	—	—	—
1450	1008	0.78	—	—	—	—	—	—	—	—
1500	1014	0.81	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD05 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	504	0.16	613	0.23	710	0.31	798	0.40	881	0.49
1300	527	0.19	632	0.27	725	0.35	810	0.44	890	0.54
1400	551	0.22	652	0.31	741	0.40	823	0.49	900	0.59
1500	576	0.26	673	0.35	759	0.44	838	0.54	912	0.65
1600	600	0.30	694	0.40	777	0.50	854	0.60	926	0.71
1700	626	0.35	716	0.45	797	0.55	871	0.66	941	0.78
1800	651	0.40	739	0.51	817	0.62	889	0.73	957	0.85
1900	677	0.46	762	0.57	838	0.69	908	0.80	974	0.93
2000	703	0.52	785	0.64	859	0.76	927	0.88	992	1.01

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	957	0.59	1030	0.70	1098	0.80	1163	0.91	1225	1.03
1300	964	0.64	1035	0.75	1102	0.86	1166	0.98	1227	1.10
1400	973	0.70	1042	0.81	1107	0.92	1170	1.04	1231	1.17
1500	983	0.76	1050	0.87	1114	0.99	1176	1.12	1235	1.24
1600	994	0.82	1060	0.94	1122	1.06	1183	1.19	1241	1.32
1700	1007	0.89	1071	1.02	1132	1.14	1191	1.27	1248	1.41
1800	1021	0.97	1083	1.10	1143	1.23	1200	1.36	1256	1.50
1900	1037	1.05	1097	1.18	1155	1.32	1211	1.45	1266	1.60
2000	1053	1.14	1111	1.27	1168	1.41	1223	1.55	1276	1.70

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance – 48PGE05 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	509	0.16	618	0.24	714	0.32	802	0.41	884	0.50
1300	533	0.19	637	0.27	730	0.36	814	0.45	894	0.55
1400	557	0.23	658	0.31	746	0.40	828	0.50	905	0.60
1500	582	0.27	679	0.36	764	0.45	843	0.55	917	0.66
1600	608	0.31	701	0.40	783	0.50	860	0.61	931	0.72
1700	634	0.36	723	0.46	803	0.56	877	0.67	947	0.79
1800	660	0.41	747	0.52	824	0.63	896	0.74	963	0.86
1900	686	0.47	770	0.58	846	0.70	915	0.82	981	0.94
2000	713	0.54	795	0.66	868	0.78	935	0.90	999	1.02

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	961	0.60	1033	0.70	1101	0.81	1166	0.92	1228	1.03
1300	968	0.65	1039	0.76	1106	0.87	1169	0.98	1230	1.10
1400	977	0.70	1046	0.82	1111	0.93	1174	1.05	1234	1.17
1500	987	0.77	1054	0.88	1118	1.00	1180	1.12	1239	1.25
1600	999	0.83	1065	0.95	1127	1.07	1187	1.20	1245	1.33
1700	1013	0.90	1076	1.03	1137	1.15	1196	1.28	1253	1.42
1800	1027	0.98	1089	1.11	1148	1.24	1206	1.37	1261	1.51
1900	1043	1.06	1103	1.20	1161	1.33	1217	1.47	1271	1.61
2000	1060	1.16	1118	1.29	1175	1.43	1229	1.57	1282	1.72

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF05 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	520	0.17	628	0.24	723	0.33	811	0.41	892	0.51
1300	545	0.20	648	0.28	739	0.37	823	0.46	902	0.56
1400	570	0.24	668	0.32	756	0.41	837	0.51	913	0.61
1500	596	0.28	691	0.37	775	0.46	853	0.56	927	0.67
1600	623	0.32	714	0.42	795	0.52	870	0.62	942	0.73
1700	650	0.37	737	0.48	816	0.58	889	0.69	958	0.80
1800	677	0.43	762	0.54	838	0.65	909	0.76	976	0.88
1900	705	0.50	787	0.61	861	0.72	929	0.84	994	0.97
2000	734	0.57	813	0.68	884	0.80	951	0.93	1014	1.06

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	968	0.61	1040	0.71	1108	0.82	1172	0.93	1233	1.04
1300	976	0.66	1046	0.77	1112	0.88	1176	1.00	1237	1.11
1400	985	0.72	1054	0.83	1119	0.95	1181	1.07	1241	1.19
1500	996	0.78	1063	0.90	1127	1.02	1188	1.14	1247	1.27
1600	1009	0.85	1074	0.97	1136	1.09	1196	1.22	1254	1.35
1700	1024	0.92	1087	1.05	1147	1.17	1205	1.31	1262	1.44
1800	1039	1.00	1100	1.13	1159	1.26	1216	1.40	1272	1.54
1900	1056	1.09	1116	1.22	1173	1.36	1229	1.50	1283	1.64
2000	1074	1.19	1132	1.32	1188	1.46	1242	1.61	1295	1.75

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD06 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	593	0.27	688	0.37	773	0.46	851	0.56	925	0.67
1600	620	0.32	711	0.42	793	0.52	868	0.62	939	0.73
1700	646	0.37	734	0.47	813	0.58	886	0.69	955	0.80
1800	673	0.43	758	0.53	835	0.64	905	0.76	972	0.88
1900	700	0.49	783	0.60	857	0.72	925	0.84	990	0.96
2000	728	0.56	807	0.68	879	0.80	946	0.92	1009	1.05
2100	755	0.63	833	0.76	903	0.88	968	1.01	1029	1.14
2200	783	0.71	858	0.84	926	0.97	990	1.11	1050	1.24
2300	811	0.80	884	0.94	950	1.07	1012	1.21	1071	1.35
2400	840	0.90	910	1.04	975	1.18	1035	1.33	1092	1.47
2500	868	1.00	937	1.15	1000	1.30	1059	1.45	1115	1.60

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	995	0.78	1061	0.89	1125	1.01	1186	1.14	1245	1.26
1600	1007	0.85	1072	0.96	1134	1.09	1194	1.22	1252	1.35
1700	1021	0.92	1084	1.04	1145	1.17	1203	1.30	1260	1.44
1800	1036	1.00	1098	1.13	1157	1.26	1214	1.39	1269	1.53
1900	1053	1.08	1112	1.22	1170	1.35	1226	1.49	1280	1.63
2000	1070	1.18	1128	1.31	1184	1.45	1238	1.60	1291	1.74
2100	1088	1.28	1145	1.42	1199	1.56	1253	1.71	1304	1.86
2200	1107	1.38	1162	1.53	1216	1.68	1268	1.83	1318	1.98
2300	1127	1.50	1181	1.65	1233	1.80	1284	1.95	1333	2.11
2400	1147	1.62	1200	1.77	1251	1.93	1300	2.09	1349	2.25
2500	1168	1.75	1220	1.91	1270	2.07	1318	2.23	1365	2.40

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE06 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	607	0.29	700	0.38	784	0.47	861	0.57	934	0.68
1600	634	0.33	724	0.43	804	0.53	879	0.64	950	0.75
1700	662	0.39	748	0.49	826	0.60	898	0.71	967	0.82
1800	690	0.45	773	0.55	848	0.67	918	0.78	985	0.90
1900	719	0.51	799	0.63	872	0.74	940	0.86	1004	0.98
2000	748	0.59	825	0.70	896	0.83	962	0.95	1024	1.08
2100	777	0.67	852	0.79	920	0.92	985	1.05	1045	1.18
2200	807	0.75	879	0.88	946	1.01	1008	1.15	1067	1.29
2300	837	0.85	907	0.98	971	1.12	1032	1.26	1090	1.40
2400	867	0.95	935	1.09	998	1.24	1057	1.38	1113	1.53
2500	897	1.06	963	1.21	1024	1.36	1082	1.51	1137	1.66

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	1004	0.79	1070	0.91	1133	1.03	1194	1.15	1253	1.28
1600	1017	0.86	1081	0.98	1143	1.11	1203	1.24	1260	1.37
1700	1032	0.94	1094	1.06	1155	1.19	1213	1.32	1269	1.46
1800	1048	1.02	1109	1.15	1168	1.28	1224	1.42	1279	1.56
1900	1066	1.11	1125	1.24	1182	1.38	1237	1.52	1291	1.66
2000	1084	1.21	1142	1.35	1197	1.49	1251	1.63	1304	1.78
2100	1104	1.31	1160	1.45	1214	1.60	1267	1.75	1318	1.90
2200	1124	1.43	1179	1.57	1231	1.72	1283	1.87	1333	2.03
2300	1145	1.55	1198	1.70	1250	1.85	1300	2.01	1349	2.17
2400	1167	1.68	1219	1.83	1269	1.99	1318	2.15	1366	2.31
2500	1189	1.82	1240	1.97	1290	2.14	1337	2.30	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance – 48PGF06 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	620	0.30	711	0.39	794	0.49	871	0.59	944	0.70
1600	648	0.35	736	0.45	816	0.55	890	0.65	960	0.76
1700	677	0.40	762	0.51	838	0.61	910	0.72	978	0.84
1800	707	0.47	788	0.58	862	0.69	931	0.80	997	0.92
1900	737	0.54	815	0.65	887	0.77	954	0.89	1017	1.01
2000	767	0.61	843	0.73	912	0.85	977	0.98	1039	1.11
2100	798	0.70	871	0.82	938	0.95	1001	1.08	1061	1.21
2200	829	0.79	900	0.92	965	1.05	1026	1.19	1084	1.33
2300	861	0.89	929	1.03	992	1.17	1052	1.31	1108	1.45
2400	893	1.00	959	1.15	1020	1.29	1078	1.43	1133	1.58
2500	925	1.12	989	1.27	1048	1.42	1105	1.57	1158	1.72

AIRFLOW (CFM)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	1013	0.81	1078	0.92	1141	1.05	1202	1.17	1260	1.30
1600	1027	0.88	1091	1.00	1152	1.13	1211	1.25	1269	1.39
1700	1043	0.96	1105	1.08	1165	1.21	1222	1.35	1278	1.48
1800	1060	1.05	1120	1.18	1179	1.31	1235	1.44	1290	1.59
1900	1078	1.14	1137	1.27	1194	1.41	1249	1.55	1302	1.70
2000	1098	1.24	1155	1.38	1210	1.52	1264	1.67	1316	1.81
2100	1119	1.35	1174	1.49	1228	1.64	1280	1.79	1331	1.94
2200	1140	1.47	1195	1.62	1247	1.77	1298	1.92	1348	2.08
2300	1163	1.60	1216	1.75	1267	1.90	1317	2.06	1365	2.22
2400	1186	1.73	1238	1.89	1288	2.05	1336	2.21	1384	2.37
2500	1210	1.88	1261	2.04	1309	2.20	1357	2.37	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD07 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	686	0.44	769	0.55	845	0.66	915	0.77	982	0.89
1900	714	0.51	794	0.62	868	0.73	936	0.85	1000	0.98
2000	742	0.58	820	0.70	891	0.82	957	0.94	1020	1.07
2100	770	0.66	846	0.78	915	0.91	979	1.03	1040	1.17
2200	799	0.74	872	0.87	939	1.00	1002	1.13	1061	1.27
2300	828	0.83	899	0.97	964	1.10	1025	1.24	1083	1.39
2400	856	0.93	926	1.07	989	1.22	1049	1.36	1105	1.51
2500	886	1.04	953	1.19	1015	1.33	1073	1.48	1128	1.64
2600	915	1.15	980	1.31	1040	1.46	1097	1.62	1151	1.77
2700	944	1.28	1008	1.44	1067	1.60	1122	1.76	1175	1.92
2800	974	1.41	1035	1.58	1093	1.74	1147	1.91	1199	2.08
2900	1003	1.55	1063	1.72	1120	1.90	1173	2.07	1223	2.24
3000	1033	1.70	1092	1.88	1146	2.06	1198	2.24	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1045	1.02	1106	1.14	1165	1.28	1222	1.41	1277	1.55
1900	1062	1.10	1121	1.24	1179	1.37	1234	1.51	1288	1.66
2000	1080	1.20	1138	1.34	1193	1.48	1247	1.62	1300	1.77
2100	1099	1.30	1155	1.44	1209	1.59	1262	1.73	1313	1.89
2200	1118	1.41	1173	1.56	1226	1.71	1278	1.86	1328	2.01
2300	1138	1.53	1192	1.68	1244	1.83	1294	1.99	1343	2.15
2400	1159	1.66	1212	1.81	1262	1.97	1312	2.13	1360	2.29
2500	1181	1.79	1232	1.95	1282	2.11	1330	2.27	—	—
2600	1203	1.93	1253	2.10	1301	2.26	—	—	—	—
2700	1226	2.08	1275	2.25	—	—	—	—	—	—
2800	1249	2.25	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE07 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	703	0.46	784	0.57	859	0.68	928	0.80	994	0.92
1900	732	0.53	811	0.64	882	0.76	950	0.88	1014	1.00
2000	761	0.61	838	0.72	907	0.85	972	0.97	1034	1.10
2100	791	0.69	865	0.81	932	0.94	996	1.07	1056	1.20
2200	822	0.78	893	0.91	958	1.04	1020	1.18	1079	1.31
2300	852	0.88	921	1.01	985	1.15	1045	1.29	1102	1.43
2400	883	0.98	950	1.13	1011	1.27	1070	1.41	1125	1.56
2500	914	1.10	978	1.25	1039	1.39	1096	1.55	1150	1.70
2600	945	1.22	1008	1.38	1066	1.53	1122	1.69	1175	1.84
2700	976	1.36	1037	1.52	1094	1.68	1148	1.84	1200	2.00
2800	1007	1.50	1067	1.67	1122	1.83	1175	2.00	1226	2.17
2900	1039	1.65	1097	1.82	1151	2.00	1203	2.17	1252	2.34
3000	1071	1.82	1127	2.00	1180	2.17	1230	2.35	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1057	1.04	1117	1.17	1176	1.30	1232	1.44	1287	1.58
1900	1075	1.13	1134	1.27	1191	1.40	1246	1.54	1299	1.69
2000	1094	1.23	1151	1.37	1207	1.51	1260	1.65	1312	1.80
2100	1114	1.34	1170	1.48	1224	1.63	1276	1.77	1327	1.93
2200	1135	1.46	1189	1.60	1242	1.75	1293	1.90	1343	2.06
2300	1157	1.58	1209	1.73	1261	1.88	1311	2.04	1359	2.20
2400	1179	1.71	1231	1.87	1281	2.02	1329	2.19	1377	2.35
2500	1202	1.85	1252	2.01	1301	2.18	1349	2.34	—	—
2600	1226	2.01	1275	2.17	1323	2.34	—	—	—	—
2700	1250	2.17	1298	2.34	—	—	—	—	—	—
2800	1275	2.34	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF07 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	719	0.48	799	0.59	872	0.70	941	0.82	1006	0.94
1900	749	0.55	826	0.67	897	0.79	964	0.91	1027	1.03
2000	780	0.63	855	0.75	923	0.88	988	1.00	1049	1.13
2100	812	0.72	884	0.85	950	0.97	1012	1.10	1072	1.24
2200	844	0.82	913	0.95	977	1.08	1038	1.22	1096	1.36
2300	876	0.92	943	1.06	1005	1.20	1064	1.34	1120	1.48
2400	908	1.04	973	1.18	1033	1.32	1091	1.47	1145	1.62
2500	941	1.16	1003	1.31	1062	1.46	1118	1.61	1171	1.76
2600	974	1.29	1034	1.45	1092	1.60	1146	1.76	1198	1.92
2700	1007	1.43	1066	1.59	1121	1.76	1174	1.92	1225	2.08
2800	1040	1.59	1097	1.75	1151	1.92	1203	2.09	1252	2.26
2900	1073	1.75	1129	1.93	1181	2.10	1232	2.27	—	—
3000	1107	1.93	1161	2.11	1212	2.29	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1069	1.06	1129	1.19	1187	1.33	1243	1.46	1297	1.61
1900	1088	1.16	1146	1.29	1202	1.43	1257	1.57	1310	1.72
2000	1108	1.26	1165	1.40	1220	1.54	1273	1.69	1325	1.84
2100	1129	1.38	1184	1.52	1238	1.67	1290	1.82	1340	1.97
2200	1151	1.50	1205	1.65	1257	1.80	1308	1.95	1357	2.11
2300	1174	1.63	1227	1.78	1278	1.93	1327	2.09	1375	2.25
2400	1198	1.77	1249	1.92	1299	2.08	1347	2.25	—	—
2500	1223	1.92	1273	2.08	1321	2.24	—	—	—	—
2600	1248	2.08	1297	2.24	—	—	—	—	—	—
2700	1274	2.25	—	—	—	—	—	—	—	—
2800	—	—	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD08 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	464	0.35	541	0.46	612	0.58	677	0.70	739	0.83
2400	479	0.40	554	0.52	622	0.64	686	0.77	745	0.90
2550	496	0.46	568	0.58	633	0.71	695	0.84	753	0.98
2700	512	0.53	582	0.65	646	0.79	705	0.92	762	1.07
2850	530	0.60	597	0.73	658	0.87	716	1.01	771	1.16
3000	547	0.68	612	0.82	672	0.96	728	1.11	782	1.26
3150	565	0.77	628	0.91	686	1.06	741	1.21	793	1.37
3300	583	0.86	644	1.01	701	1.17	754	1.32	805	1.49
3450	602	0.97	661	1.12	716	1.28	768	1.44	817	1.61
3600	621	1.08	678	1.24	732	1.41	782	1.57	831	1.75
3750	640	1.20	696	1.37	748	1.54	797	1.71	844	1.89

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	797	0.96	852	1.10	905	1.25	955	1.40	1003	1.55
2400	802	1.04	856	1.19	908	1.34	957	1.49	1005	1.65
2550	808	1.13	861	1.28	912	1.43	960	1.59	1007	1.75
2700	816	1.22	867	1.37	917	1.53	965	1.70	1011	1.86
2850	824	1.31	874	1.47	923	1.64	970	1.81	1015	1.98
3000	833	1.42	882	1.58	930	1.75	976	1.93	1020	2.11
3150	843	1.53	891	1.70	937	1.88	982	2.05	1026	2.24
3300	854	1.66	900	1.83	946	2.01	990	2.19	1033	2.38
3450	865	1.79	911	1.97	955	2.15	998	2.34	1040	2.53
3600	877	1.93	922	2.11	965	2.30	1007	2.49	1048	2.69
3750	889	2.08	933	2.26	976	2.46	1017	2.65	1057	2.86

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE08 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	463	0.35	541	0.46	611	0.58	677	0.70	738	0.83
2400	481	0.41	556	0.52	623	0.64	687	0.77	747	0.90
2550	499	0.47	571	0.59	637	0.72	698	0.85	756	0.99
2700	518	0.54	587	0.66	650	0.80	710	0.93	766	1.08
2850	537	0.62	603	0.75	665	0.88	722	1.03	777	1.18
3000	556	0.70	620	0.84	680	0.98	735	1.13	789	1.28
3150	575	0.79	637	0.93	695	1.08	749	1.24	801	1.40
3300	595	0.89	655	1.04	711	1.19	764	1.35	814	1.52
3450	615	1.00	673	1.16	727	1.32	778	1.48	828	1.65
3600	635	1.12	691	1.28	744	1.44	794	1.62	842	1.79
3750	655	1.24	710	1.41	761	1.58	810	1.76	856	1.94

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	797	0.96	852	1.10	904	1.25	954	1.40	1002	1.55
2400	803	1.04	857	1.19	909	1.34	958	1.49	1006	1.65
2550	811	1.13	864	1.28	914	1.44	963	1.60	1009	1.76
2700	820	1.23	871	1.38	921	1.54	968	1.71	1014	1.88
2850	829	1.33	879	1.49	928	1.66	974	1.83	1019	2.00
3000	840	1.44	888	1.61	936	1.78	981	1.95	1026	2.13
3150	851	1.56	898	1.73	944	1.90	989	2.08	1033	2.27
3300	862	1.69	909	1.86	954	2.04	998	2.23	1040	2.41
3450	875	1.82	920	2.00	964	2.19	1007	2.38	1049	2.57
3600	888	1.97	932	2.15	975	2.34	1017	2.54	1058	2.73
3750	901	2.12	944	2.31	987	2.51	1028	2.71	1068	2.91

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF08 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	468	0.36	545	0.46	615	0.58	680	0.71	741	0.83
2400	486	0.41	560	0.53	627	0.65	691	0.78	750	0.91
2550	505	0.48	576	0.60	641	0.72	702	0.86	760	1.00
2700	524	0.55	592	0.68	655	0.81	714	0.95	771	1.09
2850	544	0.63	609	0.76	670	0.90	728	1.04	782	1.19
3000	564	0.71	627	0.85	686	1.00	741	1.14	794	1.30
3150	584	0.81	645	0.95	702	1.10	756	1.26	807	1.42
3300	604	0.91	663	1.06	719	1.22	771	1.38	821	1.54
3450	625	1.02	682	1.18	736	1.34	787	1.51	835	1.68
3600	646	1.15	701	1.31	753	1.48	803	1.65	850	1.82
3750	667	1.28	720	1.45	771	1.62	819	1.80	865	1.98

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	799	0.97	854	1.11	907	1.26	957	1.40	1005	1.56
2400	807	1.05	860	1.20	912	1.35	961	1.50	1008	1.66
2550	815	1.14	867	1.29	918	1.45	966	1.61	1013	1.77
2700	824	1.24	875	1.40	925	1.56	972	1.72	1018	1.89
2850	834	1.35	884	1.51	932	1.67	979	1.84	1024	2.02
3000	845	1.46	894	1.63	941	1.80	986	1.97	1030	2.15
3150	857	1.58	904	1.75	950	1.93	995	2.11	1038	2.29
3300	869	1.71	916	1.89	960	2.07	1004	2.25	1046	2.44
3450	882	1.85	928	2.03	971	2.22	1014	2.41	1055	2.60
3600	896	2.00	940	2.19	983	2.38	1025	2.57	1065	2.77
3750	910	2.16	953	2.35	995	2.55	1036	2.75	1076	2.95

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD09 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	496	0.46	568	0.58	633	0.71	695	0.84	753	0.98
2700	512	0.53	582	0.65	646	0.79	705	0.92	762	1.07
2850	530	0.60	597	0.73	658	0.87	716	1.01	771	1.16
3000	547	0.68	612	0.82	672	0.96	728	1.11	782	1.26
3150	565	0.77	628	0.91	686	1.06	741	1.21	793	1.37
3300	583	0.86	644	1.01	701	1.17	754	1.32	805	1.49
3450	602	0.97	661	1.12	716	1.28	768	1.44	817	1.61
3600	621	1.08	678	1.24	732	1.41	782	1.57	831	1.75
3750	640	1.20	696	1.37	748	1.54	797	1.71	844	1.89
3900	659	1.33	713	1.50	764	1.68	812	1.86	858	2.05
4050	679	1.47	731	1.65	781	1.83	828	2.02	873	2.21
4200	698	1.62	750	1.81	798	2.00	844	2.19	888	2.38

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	808	1.13	861	1.28	912	1.43	960	1.59	1007	1.75
2700	816	1.22	867	1.37	917	1.53	965	1.70	1011	1.86
2850	824	1.31	874	1.47	923	1.64	970	1.81	1015	1.98
3000	833	1.42	882	1.58	930	1.75	976	1.93	1020	2.11
3150	843	1.53	891	1.70	937	1.88	982	2.05	1026	2.24
3300	854	1.66	900	1.83	946	2.01	990	2.19	1033	2.38
3450	865	1.79	911	1.97	955	2.15	998	2.34	1040	2.53
3600	877	1.93	922	2.11	965	2.30	1007	2.49	1048	2.69
3750	889	2.08	933	2.26	976	2.46	1017	2.65	1057	2.86
3900	903	2.24	945	2.43	987	2.63	1027	2.83	1067	3.03
4050	916	2.40	958	2.60	999	2.81	1038	3.01	1077	3.22
4200	930	2.58	971	2.79	1011	3.00	1050	3.21	1088	3.42

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE09 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	499	0.47	571	0.59	637	0.72	698	0.85	756	0.99
2700	518	0.54	587	0.66	650	0.80	710	0.93	766	1.08
2850	537	0.62	603	0.75	665	0.88	722	1.03	777	1.18
3000	556	0.70	620	0.84	680	0.98	735	1.13	789	1.28
3150	575	0.79	637	0.93	695	1.08	749	1.24	801	1.40
3300	595	0.89	655	1.04	711	1.19	764	1.35	814	1.52
3450	615	1.00	673	1.16	727	1.32	778	1.48	828	1.65
3600	635	1.12	691	1.28	744	1.44	794	1.62	842	1.79
3750	655	1.24	710	1.41	761	1.58	810	1.76	856	1.94
3900	675	1.38	728	1.55	778	1.73	826	1.91	871	2.10
4050	695	1.52	747	1.71	796	1.89	842	2.08	886	2.27
4200	716	1.68	766	1.87	814	2.06	859	2.25	902	2.45

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	811	1.13	864	1.28	914	1.44	963	1.60	1009	1.76
2700	820	1.23	871	1.38	921	1.54	968	1.71	1014	1.88
2850	829	1.33	879	1.49	928	1.66	974	1.83	1019	2.00
3000	840	1.44	888	1.61	936	1.78	981	1.95	1026	2.13
3150	851	1.56	898	1.73	944	1.90	989	2.08	1033	2.27
3300	862	1.69	909	1.86	954	2.04	998	2.23	1040	2.41
3450	875	1.82	920	2.00	964	2.19	1007	2.38	1049	2.57
3600	888	1.97	932	2.15	975	2.34	1017	2.54	1058	2.73
3750	901	2.12	944	2.31	987	2.51	1028	2.71	1068	2.91
3900	915	2.29	957	2.48	999	2.68	1039	2.89	1078	3.09
4050	929	2.47	971	2.67	1011	2.87	1051	3.08	1089	3.29
4200	944	2.65	985	2.86	1024	3.07	1063	3.28	1100	3.50

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF09 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	505	0.48	576	0.60	641	0.72	702	0.86	760	1.00
2700	524	0.55	592	0.68	655	0.81	714	0.95	771	1.09
2850	544	0.63	609	0.76	670	0.90	728	1.04	782	1.19
3000	564	0.71	627	0.85	686	1.00	741	1.14	794	1.30
3150	584	0.81	645	0.95	702	1.10	756	1.26	807	1.42
3300	604	0.91	663	1.06	719	1.22	771	1.38	821	1.54
3450	625	1.02	682	1.18	736	1.34	787	1.51	835	1.68
3600	646	1.15	701	1.31	753	1.48	803	1.65	850	1.82
3750	667	1.28	720	1.45	771	1.62	819	1.80	865	1.98
3900	688	1.42	740	1.60	789	1.77	836	1.96	881	2.14
4050	709	1.57	760	1.75	808	1.94	854	2.13	898	2.32
4200	730	1.73	780	1.92	827	2.12	871	2.31	914	2.51

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	815	1.14	867	1.29	918	1.45	966	1.61	1013	1.77
2700	824	1.24	875	1.40	925	1.56	972	1.72	1018	1.89
2850	834	1.35	884	1.51	932	1.67	979	1.84	1024	2.02
3000	845	1.46	894	1.63	941	1.80	986	1.97	1030	2.15
3150	857	1.58	904	1.75	950	1.93	995	2.11	1038	2.29
3300	869	1.71	916	1.89	960	2.07	1004	2.25	1046	2.44
3450	882	1.85	928	2.03	971	2.22	1014	2.41	1055	2.60
3600	896	2.00	940	2.19	983	2.38	1025	2.57	1065	2.77
3750	910	2.16	953	2.35	995	2.55	1036	2.75	1076	2.95
3900	925	2.33	967	2.53	1008	2.73	1048	2.93	1087	3.14
4050	940	2.52	981	2.72	1021	2.92	1060	3.13	1099	3.35
4200	956	2.71	996	2.92	1035	3.13	1074	3.34	1111	3.56

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD12 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	566	0.72	630	0.86	688	1.00	744	1.15	797	1.31
3200	593	0.85	653	0.99	710	1.15	763	1.30	814	1.46
3400	620	0.99	678	1.15	732	1.30	783	1.47	832	1.64
3600	647	1.15	702	1.31	754	1.48	804	1.65	851	1.83
3800	674	1.33	728	1.50	778	1.67	825	1.85	871	2.03
4000	702	1.52	753	1.70	802	1.88	848	2.07	892	2.26
4200	729	1.73	779	1.92	826	2.11	870	2.31	913	2.50
4400	757	1.96	805	2.16	850	2.36	894	2.56	935	2.77
4600	785	2.21	832	2.42	875	2.63	917	2.84	958	3.05
4800	814	2.49	858	2.70	901	2.92	941	3.14	981	3.36
5000	842	2.78	885	3.01	926	3.23	966	3.46	1004	3.69

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	847	1.47	896	1.63	943	1.80	988	1.98	1032	2.16
3200	863	1.63	910	1.80	955	1.98	999	2.16	1042	2.35
3400	879	1.81	925	1.99	969	2.17	1012	2.36	1054	2.55
3600	897	2.01	941	2.19	984	2.38	1026	2.58	1066	2.78
3800	915	2.22	958	2.41	1000	2.61	1040	2.81	1080	3.02
4000	935	2.45	976	2.65	1017	2.86	1056	3.06	1095	3.28
4200	955	2.71	995	2.91	1035	3.12	1073	3.34	1110	3.55
4400	976	2.98	1015	3.19	1053	3.41	1090	3.63	—	—
4600	997	3.27	1035	3.49	—	—	—	—	—	—
4800	1019	3.59	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE12 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	574	0.74	636	0.87	695	1.02	750	1.17	802	1.32
3200	601	0.87	661	1.01	717	1.17	770	1.32	820	1.49
3400	629	1.02	686	1.17	740	1.33	791	1.49	840	1.66
3600	657	1.18	712	1.34	764	1.51	813	1.68	860	1.86
3800	686	1.36	739	1.53	788	1.71	836	1.89	881	2.07
4000	715	1.56	765	1.74	813	1.93	859	2.12	903	2.31
4200	744	1.78	792	1.97	839	2.17	883	2.36	925	2.56
4400	773	2.03	820	2.22	864	2.43	907	2.63	949	2.84
4600	802	2.29	848	2.50	891	2.71	932	2.92	972	3.13
4800	832	2.58	876	2.79	917	3.01	958	3.23	996	3.45
5000	862	2.88	904	3.11	944	3.34	983	3.56	–	–

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	853	1.48	901	1.65	948	1.82	993	2.00	1037	2.18
3200	869	1.65	916	1.83	961	2.00	1005	2.19	1048	2.37
3400	887	1.84	932	2.02	976	2.20	1019	2.39	1060	2.58
3600	905	2.04	949	2.23	992	2.42	1033	2.61	1074	2.81
3800	925	2.26	967	2.46	1009	2.65	1049	2.86	1088	3.06
4000	945	2.50	987	2.70	1027	2.91	1066	3.12	1104	3.33
4200	967	2.76	1007	2.97	1046	3.18	1084	3.40	1121	3.62
4400	988	3.05	1027	3.26	1065	3.48	1102	3.70	–	–
4600	1011	3.35	1049	3.57	–	–	–	–	–	–
4800	1034	3.68	–	–	–	–	–	–	–	–
5000	–	–	–	–	–	–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF12 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	578	0.74	640	0.88	698	1.03	753	1.18	805	1.33
3200	606	0.88	665	1.03	721	1.18	774	1.34	824	1.50
3400	635	1.03	691	1.18	745	1.34	795	1.51	844	1.68
3600	663	1.20	718	1.36	769	1.53	818	1.70	865	1.88
3800	693	1.38	745	1.56	794	1.73	841	1.91	886	2.10
4000	722	1.59	772	1.77	820	1.95	865	2.14	909	2.33
4200	752	1.81	800	2.00	846	2.20	889	2.39	932	2.59
4400	781	2.06	828	2.26	872	2.46	914	2.66	955	2.87
4600	811	2.33	856	2.54	899	2.75	940	2.96	980	3.17
4800	841	2.62	884	2.84	926	3.05	966	3.28	1004	3.50
5000	871	2.94	913	3.16	953	3.39	992	3.62	–	–

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	856	1.49	904	1.66	951	1.83	996	2.01	1040	2.19
3200	873	1.67	919	1.84	965	2.02	1008	2.20	1051	2.39
3400	891	1.85	936	2.03	980	2.22	1022	2.41	1064	2.60
3600	910	2.06	954	2.25	996	2.44	1037	2.63	1078	2.83
3800	930	2.29	972	2.48	1014	2.68	1054	2.88	1093	3.09
4000	951	2.53	992	2.73	1032	2.94	1071	3.15	1109	3.36
4200	973	2.80	1013	3.00	1051	3.22	1089	3.43	1126	3.65
4400	995	3.08	1034	3.30	1072	3.52	–	–	–	–
4600	1018	3.39	1056	3.61	–	–	–	–	–	–
4800	–	–	–	–	–	–	–	–	–	–
5000	–	–	–	–	–	–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD14 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	667	1.28	721	1.45	772	1.62	820	1.80	866	1.98
3950	695	1.47	747	1.65	796	1.83	842	2.01	887	2.20
4150	723	1.68	772	1.86	820	2.05	865	2.25	908	2.44
4350	750	1.90	799	2.10	844	2.30	888	2.50	930	2.70
4550	778	2.15	825	2.35	869	2.56	911	2.77	952	2.98
4750	807	2.42	851	2.63	894	2.85	935	3.06	975	3.28
4950	835	2.71	878	2.93	920	3.15	960	3.38	998	3.61
5150	863	3.02	905	3.25	946	3.48	984	3.72	1022	3.95
5350	892	3.36	933	3.60	972	3.84	1009	4.08	1046	4.32
5550	920	3.72	960	3.97	998	4.22	1035	4.47	1070	4.72
5750	949	4.10	987	4.36	1024	4.62	1060	4.88	1095	5.14
5950	978	4.52	1015	4.78	1051	5.05	—	—	—	—
6150	1006	4.96	1043	5.23	—	—	—	—	—	—
6250	1021	5.19	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	911	2.17	954	2.36	996	2.55	1037	2.75	1076	2.95
3950	930	2.39	972	2.59	1012	2.79	1052	3.00	1091	3.21
4150	950	2.64	991	2.85	1030	3.05	1069	3.27	1106	3.48
4350	971	2.91	1010	3.12	1048	3.34	1086	3.55	1123	3.78
4550	992	3.20	1030	3.41	1068	3.64	1104	3.86	1140	4.09
4750	1013	3.50	1051	3.73	1087	3.96	1123	4.19	1158	4.43
4950	1036	3.84	1072	4.07	1108	4.31	1142	4.55	1176	4.79
5150	1058	4.19	1094	4.43	1129	4.68	1162	4.93	1196	5.18
5350	1082	4.57	1116	4.82	1150	5.07	—	—	—	—
5550	1105	4.98	1139	5.23	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE14 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	679	1.31	732	1.49	782	1.66	830	1.84	876	2.02
3950	708	1.51	759	1.69	807	1.87	853	2.06	897	2.25
4150	737	1.73	786	1.92	832	2.11	877	2.30	920	2.50
4350	766	1.96	813	2.16	858	2.36	901	2.56	943	2.76
4550	795	2.22	841	2.43	884	2.63	926	2.84	966	3.06
4750	825	2.50	869	2.72	911	2.93	951	3.15	990	3.37
4950	854	2.80	897	3.03	938	3.25	977	3.48	1015	3.71
5150	884	3.13	925	3.36	965	3.60	1003	3.83	1040	4.07
5350	914	3.49	954	3.73	992	3.97	1029	4.21	1065	4.46
5550	944	3.86	982	4.11	1020	4.36	1056	4.62	1091	4.87
5750	974	4.27	1011	4.53	1048	4.79	1083	5.05	—	—
5950	1004	4.70	1040	4.97	1076	5.24	—	—	—	—
6150	1034	5.17	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	920	2.21	963	2.40	1004	2.59	1045	2.79	1084	3.00
3950	940	2.44	982	2.64	1022	2.84	1061	3.05	1100	3.26
4150	961	2.70	1001	2.90	1041	3.11	1079	3.33	1116	3.54
4350	983	2.97	1022	3.19	1060	3.40	1097	3.62	1134	3.85
4550	1005	3.27	1043	3.49	1080	3.72	1117	3.94	1152	4.17
4750	1028	3.59	1065	3.82	1101	4.05	1137	4.29	1171	4.52
4950	1052	3.94	1088	4.17	1123	4.41	1157	4.65	1191	4.90
5150	1076	4.31	1111	4.55	1145	4.80	1179	5.05	—	—
5350	1100	4.70	1134	4.95	1168	5.21	—	—	—	—
5550	1125	5.13	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF14 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	685	1.33	738	1.51	788	1.68	835	1.86	881	2.04
3950	715	1.54	765	1.71	813	1.90	859	2.08	903	2.27
4150	744	1.76	793	1.94	839	2.13	883	2.33	926	2.53
4350	774	2.00	821	2.19	865	2.39	908	2.59	950	2.80
4550	804	2.26	849	2.47	892	2.67	934	2.88	974	3.10
4750	834	2.54	877	2.76	919	2.98	959	3.19	998	3.42
4950	864	2.85	906	3.08	946	3.30	985	3.53	1023	3.76
5150	894	3.19	935	3.42	974	3.65	1012	3.89	1049	4.13
5350	924	3.55	964	3.79	1002	4.03	1039	4.28	1074	4.52
5550	955	3.94	993	4.19	1030	4.44	1066	4.69	1101	4.94
5750	985	4.35	1023	4.61	1058	4.87	1093	5.13	—	—
5950	1016	4.79	1052	5.06	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	925	2.23	968	2.42	1009	2.62	1050	2.82	1089	3.02
3950	946	2.47	987	2.67	1027	2.87	1067	3.08	1105	3.29
4150	967	2.73	1007	2.93	1047	3.14	1085	3.36	1122	3.58
4350	990	3.01	1029	3.22	1067	3.44	1104	3.66	1140	3.89
4550	1012	3.31	1050	3.53	1087	3.76	1123	3.99	1159	4.22
4750	1036	3.64	1073	3.87	1109	4.10	1144	4.34	1178	4.57
4950	1060	3.99	1096	4.23	1131	4.47	1165	4.71	1199	4.96
5150	1084	4.37	1119	4.61	1153	4.86	1187	5.11	—	—
5350	1109	4.77	1143	5.02	—	—	—	—	—	—
5550	1135	5.20	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD03 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	387	0.05	529	0.09	641	0.14	736	0.20	821	0.25
650	391	0.05	532	0.10	643	0.15	738	0.21	822	0.27
700	397	0.06	535	0.11	646	0.16	741	0.22	824	0.28
750	402	0.06	539	0.12	649	0.17	743	0.23	826	0.30
800	408	0.07	543	0.12	652	0.18	745	0.25	829	0.31
850	415	0.08	547	0.13	655	0.20	748	0.26	831	0.33
900	422	0.08	552	0.14	659	0.21	751	0.28	834	0.35
950	430	0.09	557	0.15	662	0.22	754	0.29	837	0.37
1000	437	0.10	562	0.16	666	0.23	758	0.31	839	0.38

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	897	0.31	967	0.38	1032	0.45	1094	0.51	1152	0.59
650	899	0.33	969	0.40	1034	0.47	1096	0.54	1154	0.61
700	900	0.35	970	0.42	1036	0.49	1097	0.56	1155	0.64
750	902	0.37	972	0.44	1038	0.51	1099	0.59	1157	0.66
800	904	0.38	974	0.46	1039	0.53	1101	0.61	1159	0.69
850	907	0.40	976	0.48	1041	0.56	1102	0.64	1160	0.72
900	909	0.42	978	0.50	1043	0.58	1104	0.66	1162	0.75
950	911	0.44	981	0.52	1045	0.61	1106	0.69	1164	0.78
1000	914	0.46	983	0.55	1048	0.63	1109	0.72	1166	0.81

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 656 to 1001 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD04 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	422	0.08	552	0.14	659	0.21	751	0.28	834	0.35
950	430	0.09	557	0.15	662	0.22	754	0.29	837	0.37
1000	437	0.10	562	0.16	666	0.23	758	0.31	839	0.38
1050	446	0.11	568	0.17	671	0.25	761	0.32	843	0.40
1100	454	0.12	573	0.19	675	0.26	765	0.34	846	0.42
1150	463	0.13	580	0.20	680	0.28	769	0.36	849	0.44
1200	473	0.14	586	0.21	685	0.29	773	0.37	853	0.46
1250	482	0.15	593	0.23	691	0.31	778	0.39	857	0.48
1300	492	0.16	601	0.24	697	0.32	783	0.41	861	0.50
1350	503	0.18	608	0.26	703	0.34	788	0.43	865	0.53
1400	513	0.19	616	0.27	709	0.36	793	0.45	870	0.55
1450	524	0.21	624	0.29	716	0.38	799	0.48	875	0.58
1500	535	0.23	633	0.31	722	0.40	804	0.50	880	0.60

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	909	0.42	978	0.50	1043	0.58	1104	0.66	1162	0.75
950	911	0.44	981	0.52	1045	0.61	1106	0.69	1164	0.78
1000	914	0.46	983	0.55	1048	0.63	1109	0.72	1166	0.81
1050	917	0.48	986	0.57	1050	0.66	1111	0.75	1168	0.84
1100	920	0.51	988	0.59	1053	0.68	1113	0.78	—	—
1150	923	0.53	991	0.62	1055	0.71	1116	0.81	—	—
1200	926	0.55	994	0.64	1058	0.74	1118	0.84	—	—
1250	930	0.58	997	0.67	1061	0.77	—	—	—	—
1300	933	0.60	1001	0.70	1064	0.80	—	—	—	—
1350	937	0.63	1004	0.73	1067	0.83	—	—	—	—
1400	941	0.65	1008	0.75	—	—	—	—	—	—
1450	945	0.68	1012	0.78	—	—	—	—	—	—
1500	950	0.71	1016	0.81	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE04 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	425	0.08	554	0.14	661	0.21	754	0.28	837	0.35
950	433	0.09	560	0.15	665	0.22	757	0.29	840	0.37
1000	442	0.10	565	0.16	669	0.24	761	0.31	843	0.39
1050	450	0.11	571	0.18	674	0.25	764	0.33	846	0.41
1100	459	0.12	577	0.19	679	0.26	768	0.34	849	0.43
1150	469	0.13	584	0.20	684	0.28	773	0.36	853	0.45
1200	478	0.14	591	0.22	689	0.29	777	0.38	857	0.47
1250	488	0.16	598	0.23	695	0.31	782	0.40	861	0.49
1300	498	0.17	606	0.25	701	0.33	787	0.42	865	0.51
1350	509	0.18	614	0.26	707	0.35	792	0.44	870	0.53
1400	520	0.20	622	0.28	714	0.37	798	0.46	874	0.56
1450	531	0.21	630	0.30	721	0.39	803	0.48	879	0.58
1500	542	0.23	639	0.32	728	0.41	809	0.51	885	0.61

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	912	0.43	982	0.50	1047	0.59	1108	0.67	1167	0.75
950	915	0.45	984	0.53	1049	0.61	1110	0.70	1168	0.78
1000	917	0.47	987	0.55	1051	0.64	1113	0.72	1170	0.81
1050	920	0.49	989	0.57	1054	0.66	1115	0.75	1173	0.85
1100	923	0.51	992	0.60	1056	0.69	1117	0.78	—	—
1150	926	0.53	995	0.62	1059	0.72	1120	0.81	—	—
1200	930	0.56	998	0.65	1062	0.75	1122	0.84	—	—
1250	933	0.58	1001	0.68	1065	0.77	—	—	—	—
1300	937	0.61	1005	0.70	1068	0.80	—	—	—	—
1350	941	0.63	1008	0.73	1071	0.83	—	—	—	—
1400	945	0.66	1012	0.76	—	—	—	—	—	—
1450	950	0.68	1016	0.79	—	—	—	—	—	—
1500	955	0.71	1020	0.82	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF04 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	432	0.09	560	0.15	667	0.21	760	0.28	843	0.36
950	441	0.09	566	0.16	671	0.23	763	0.30	846	0.37
1000	450	0.10	572	0.17	676	0.24	767	0.31	849	0.39
1050	459	0.11	578	0.18	680	0.25	771	0.33	852	0.41
1100	468	0.12	585	0.19	686	0.27	775	0.35	856	0.43
1150	478	0.14	592	0.21	691	0.28	780	0.37	860	0.45
1200	489	0.15	600	0.22	697	0.30	784	0.39	864	0.47
1250	499	0.16	608	0.24	703	0.32	790	0.41	868	0.50
1300	510	0.18	616	0.25	710	0.34	795	0.43	873	0.52
1350	521	0.19	624	0.27	717	0.36	801	0.45	878	0.54
1400	533	0.21	633	0.29	724	0.38	807	0.47	883	0.57
1450	545	0.23	642	0.31	731	0.40	813	0.49	888	0.59
1500	556	0.24	652	0.33	739	0.42	819	0.52	894	0.62

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	919	0.43	989	0.51	1055	0.60	1117	0.68	1175	0.77
950	921	0.45	991	0.54	1057	0.62	1119	0.71	1177	0.80
1000	924	0.48	994	0.56	1059	0.65	1121	0.74	1179	0.83
1050	927	0.50	996	0.58	1061	0.67	1123	0.77	—	—
1100	930	0.52	999	0.61	1064	0.70	1125	0.80	—	—
1150	934	0.54	1002	0.63	1067	0.73	1128	0.83	—	—
1200	937	0.57	1005	0.66	1070	0.76	—	—	—	—
1250	941	0.59	1009	0.69	1073	0.79	—	—	—	—
1300	945	0.62	1013	0.72	1076	0.82	—	—	—	—
1350	949	0.64	1016	0.74	1080	0.85	—	—	—	—
1400	954	0.67	1020	0.77	—	—	—	—	—	—
1450	959	0.70	1025	0.80	—	—	—	—	—	—
1500	964	0.73	1029	0.84	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD05 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	436	0.12	559	0.19	661	0.27	753	0.35	839	0.45
1300	456	0.14	574	0.22	673	0.30	762	0.39	845	0.49
1400	477	0.17	592	0.25	687	0.34	774	0.43	853	0.53
1500	500	0.20	611	0.29	703	0.38	787	0.48	864	0.58
1600	523	0.24	631	0.33	721	0.43	801	0.53	877	0.63
1700	548	0.28	652	0.38	739	0.48	818	0.58	891	0.69
1800	573	0.32	674	0.43	759	0.54	835	0.64	906	0.76
1900	600	0.37	697	0.48	779	0.60	854	0.71	923	0.83
2000	627	0.43	720	0.55	801	0.67	873	0.79	941	0.91

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	918	0.54	993	0.64	1063	0.75	1130	0.86	1193	0.97
1300	922	0.58	995	0.69	1064	0.80	1130	0.91	1193	1.03
1400	929	0.63	1000	0.74	1067	0.85	1132	0.97	1194	1.09
1500	937	0.69	1006	0.80	1072	0.91	1136	1.03	1196	1.16
1600	947	0.74	1015	0.86	1079	0.98	1141	1.10	1201	1.23
1700	959	0.81	1025	0.93	1088	1.05	1148	1.18	1207	1.31
1800	973	0.88	1037	1.00	1098	1.13	1157	1.26	1214	1.39
1900	988	0.95	1050	1.08	1110	1.21	1168	1.35	1223	1.48
2000	1004	1.04	1065	1.17	1123	1.30	1179	1.44	1234	1.58

LEGEND

Bhp — Brake Horsepower

High−Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE05 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	443	0.12	564	0.20	666	0.27	758	0.36	842	0.45
1300	463	0.15	580	0.22	678	0.31	767	0.40	849	0.49
1400	485	0.17	598	0.26	693	0.34	778	0.44	858	0.54
1500	508	0.21	617	0.30	709	0.39	792	0.48	869	0.59
1600	532	0.24	638	0.34	727	0.43	807	0.54	882	0.64
1700	558	0.28	660	0.39	746	0.49	824	0.59	896	0.70
1800	584	0.33	682	0.44	766	0.55	842	0.66	912	0.77
1900	611	0.38	706	0.50	788	0.61	861	0.72	930	0.84
2000	639	0.44	731	0.56	810	0.68	882	0.80	948	0.92

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	922	0.55	996	0.65	1066	0.75	1133	0.86	1196	0.97
1300	926	0.59	999	0.69	1068	0.80	1133	0.92	1196	1.03
1400	933	0.64	1004	0.75	1071	0.86	1136	0.98	1197	1.10
1500	942	0.69	1011	0.80	1077	0.92	1140	1.04	1200	1.17
1600	952	0.75	1020	0.87	1084	0.99	1146	1.11	1205	1.24
1700	965	0.82	1030	0.94	1093	1.06	1153	1.19	1211	1.32
1800	979	0.89	1043	1.01	1104	1.14	1163	1.27	1220	1.41
1900	995	0.97	1057	1.09	1116	1.22	1174	1.36	1229	1.50
2000	1012	1.05	1072	1.18	1130	1.32	1186	1.46	1240	1.60

LEGEND

Bhp — Brake Horsepower

High−Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF05 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	456	0.13	574	0.20	675	0.28	766	0.37	850	0.46
1300	477	0.16	591	0.23	688	0.32	776	0.41	857	0.50
1400	500	0.18	610	0.27	703	0.36	788	0.45	867	0.55
1500	524	0.22	630	0.31	720	0.40	802	0.50	879	0.60
1600	550	0.26	652	0.35	739	0.45	819	0.55	893	0.66
1700	576	0.30	675	0.40	759	0.50	836	0.61	908	0.72
1800	604	0.35	699	0.46	781	0.57	856	0.68	925	0.79
1900	633	0.41	724	0.52	804	0.63	876	0.75	944	0.87
2000	662	0.47	750	0.59	828	0.71	898	0.83	964	0.95

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	929	0.56	1003	0.66	1073	0.76	1139	0.87	1202	0.98
1300	934	0.60	1006	0.71	1075	0.82	1140	0.93	1202	1.05
1400	941	0.65	1012	0.76	1079	0.87	1143	0.99	1204	1.11
1500	951	0.71	1020	0.82	1085	0.94	1148	1.06	1208	1.18
1600	963	0.77	1029	0.89	1093	1.01	1155	1.13	1214	1.26
1700	976	0.84	1041	0.96	1103	1.08	1163	1.21	1221	1.34
1800	991	0.91	1054	1.04	1115	1.16	1174	1.30	1230	1.43
1900	1008	0.99	1070	1.12	1129	1.25	1186	1.39	1241	1.53
2000	1026	1.08	1086	1.21	1144	1.35	1199	1.49	1253	1.63

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive, 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD06 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	521	0.22	628	0.31	718	0.40	800	0.49	877	0.60
1600	546	0.25	649	0.35	737	0.45	816	0.55	890	0.65
1700	572	0.30	671	0.40	757	0.50	834	0.61	906	0.72
1800	599	0.35	695	0.45	777	0.56	852	0.67	922	0.79
1900	627	0.40	719	0.51	799	0.63	872	0.74	940	0.86
2000	655	0.46	745	0.58	822	0.70	893	0.82	959	0.94
2100	684	0.53	771	0.66	846	0.78	915	0.91	979	1.03
2200	714	0.61	797	0.74	871	0.87	938	1.00	1001	1.13
2300	744	0.69	824	0.83	896	0.96	961	1.10	1022	1.24
2400	775	0.78	852	0.92	922	1.06	985	1.21	1045	1.35
2500	806	0.88	880	1.03	948	1.18	1010	1.32	1069	1.47

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	949	0.70	1018	0.82	1083	0.93	1146	1.05	1207	1.18
1600	961	0.77	1027	0.88	1091	1.00	1153	1.13	1212	1.26
1700	974	0.83	1039	0.95	1101	1.08	1161	1.21	1219	1.34
1800	988	0.91	1052	1.03	1112	1.16	1171	1.29	1227	1.43
1900	1004	0.99	1066	1.11	1125	1.25	1182	1.38	1238	1.52
2000	1022	1.07	1082	1.20	1139	1.34	1195	1.48	1249	1.62
2100	1040	1.17	1099	1.30	1155	1.44	1209	1.59	1262	1.73
2200	1060	1.27	1117	1.41	1172	1.55	1225	1.70	1277	1.85
2300	1081	1.38	1136	1.52	1190	1.67	1242	1.82	1292	1.98
2400	1102	1.50	1156	1.65	1209	1.80	1259	1.96	1309	2.12
2500	1124	1.62	1177	1.78	1228	1.94	1278	2.10	1326	2.26

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE06 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	536	0.23	640	0.32	729	0.41	811	0.51	887	0.61
1600	563	0.27	663	0.36	749	0.46	828	0.56	901	0.67
1700	590	0.31	686	0.42	770	0.52	846	0.62	917	0.74
1800	619	0.37	711	0.47	792	0.58	866	0.69	935	0.81
1900	648	0.43	737	0.54	816	0.65	887	0.77	954	0.89
2000	678	0.49	764	0.61	840	0.73	909	0.85	975	0.98
2100	709	0.56	792	0.69	865	0.81	933	0.94	996	1.07
2200	740	0.65	820	0.78	891	0.91	957	1.04	1019	1.17
2300	772	0.73	849	0.87	918	1.01	982	1.14	1042	1.28
2400	804	0.83	879	0.97	946	1.12	1008	1.26	1066	1.40
2500	837	0.94	909	1.09	974	1.24	1034	1.38	1092	1.53

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	958	0.72	1027	0.83	1092	0.95	1154	1.07	1214	1.20
1600	971	0.78	1037	0.90	1101	1.02	1162	1.15	1221	1.28
1700	985	0.85	1049	0.97	1111	1.10	1171	1.23	1228	1.36
1800	1001	0.93	1063	1.05	1124	1.18	1182	1.32	1238	1.45
1900	1018	1.01	1079	1.14	1138	1.27	1194	1.41	1249	1.55
2000	1036	1.10	1096	1.24	1153	1.37	1208	1.51	1262	1.66
2100	1056	1.20	1114	1.34	1170	1.48	1224	1.63	1276	1.78
2200	1077	1.31	1134	1.45	1188	1.60	1241	1.75	1292	1.90
2300	1099	1.43	1154	1.57	1207	1.72	1259	1.88	1309	2.03
2400	1122	1.55	1176	1.70	1228	1.86	1278	2.02	1327	2.18
2500	1146	1.69	1198	1.84	1249	2.00	1298	2.16	1346	2.33

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF06 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	551	0.24	653	0.33	741	0.42	821	0.52	896	0.62
1600	579	0.28	676	0.38	761	0.48	839	0.58	912	0.69
1700	608	0.33	701	0.43	783	0.54	858	0.64	929	0.76
1800	638	0.39	727	0.49	807	0.60	879	0.71	948	0.83
1900	668	0.45	755	0.56	831	0.68	902	0.79	968	0.91
2000	700	0.52	783	0.64	857	0.76	925	0.88	990	1.01
2100	732	0.60	812	0.72	884	0.85	950	0.97	1013	1.11
2200	765	0.68	842	0.81	912	0.95	976	1.08	1037	1.21
2300	799	0.78	873	0.92	940	1.05	1002	1.19	1062	1.33
2400	833	0.88	904	1.03	969	1.17	1030	1.31	1087	1.46
2500	867	1.00	936	1.15	999	1.30	1058	1.44	1114	1.60

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	968	0.73	1035	0.85	1100	0.97	1162	1.09	1222	1.21
1600	981	0.80	1047	0.92	1110	1.04	1171	1.16	1229	1.29
1700	996	0.87	1060	0.99	1121	1.12	1181	1.25	1238	1.38
1800	1013	0.95	1075	1.08	1135	1.21	1193	1.34	1248	1.48
1900	1031	1.04	1092	1.17	1150	1.30	1206	1.44	1261	1.58
2000	1051	1.14	1110	1.27	1166	1.41	1221	1.55	1275	1.69
2100	1072	1.24	1129	1.38	1185	1.52	1238	1.67	1290	1.82
2200	1094	1.35	1150	1.50	1204	1.64	1256	1.79	1307	1.95
2300	1118	1.48	1172	1.62	1225	1.77	1275	1.93	1325	2.09
2400	1142	1.61	1195	1.76	1246	1.92	1296	2.07	1344	2.24
2500	1168	1.75	1219	1.91	1269	2.07	1317	2.23	1365	2.40

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD07 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	614	0.36	707	0.47	788	0.58	863	0.69	932	0.80
1900	642	0.42	732	0.53	811	0.64	883	0.76	950	0.88
2000	671	0.48	758	0.60	835	0.72	905	0.84	970	0.97
2100	701	0.55	785	0.68	859	0.80	927	0.93	991	1.06
2200	731	0.63	812	0.76	884	0.89	950	1.02	1012	1.16
2300	762	0.72	840	0.85	910	0.99	975	1.13	1035	1.27
2400	793	0.81	869	0.95	937	1.10	999	1.24	1058	1.38
2500	825	0.91	898	1.06	964	1.21	1025	1.36	1082	1.51
2600	856	1.03	927	1.18	991	1.33	1051	1.49	1107	1.64
2700	889	1.15	957	1.31	1019	1.47	1077	1.63	1132	1.79
2800	921	1.28	987	1.44	1048	1.61	1104	1.78	1158	1.94
2900	953	1.42	1017	1.59	1076	1.76	1132	1.94	1184	2.11
3000	986	1.57	1048	1.75	1106	1.93	1160	2.10	1211	2.28

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	997	0.92	1060	1.05	1121	1.18	1179	1.31	1235	1.45
1900	1014	1.01	1075	1.13	1134	1.27	1191	1.40	1246	1.54
2000	1032	1.09	1092	1.23	1149	1.36	1204	1.50	1258	1.65
2100	1051	1.19	1109	1.33	1165	1.47	1219	1.61	1272	1.76
2200	1071	1.30	1128	1.44	1183	1.58	1235	1.73	1287	1.88
2300	1093	1.41	1148	1.56	1201	1.70	1253	1.86	1303	2.01
2400	1115	1.53	1168	1.68	1220	1.84	1271	1.99	1320	2.15
2500	1137	1.66	1190	1.82	1241	1.98	1290	2.14	1338	2.30
2600	1161	1.80	1212	1.96	1262	2.12	1310	2.29	—	—
2700	1185	1.95	1235	2.12	1284	2.28	—	—	—	—
2800	1209	2.11	1259	2.28	—	—	—	—	—	—
2900	1235	2.28	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE07 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	633	0.38	723	0.49	803	0.60	876	0.71	944	0.83
1900	663	0.44	750	0.56	827	0.67	898	0.79	964	0.91
2000	694	0.51	777	0.63	852	0.75	921	0.87	985	1.00
2100	725	0.59	806	0.71	878	0.84	945	0.96	1007	1.09
2200	757	0.67	835	0.80	905	0.93	969	1.06	1030	1.20
2300	789	0.76	864	0.90	932	1.04	995	1.17	1055	1.31
2400	822	0.86	894	1.01	960	1.15	1022	1.29	1079	1.44
2500	855	0.98	925	1.12	989	1.27	1049	1.42	1105	1.57
2600	889	1.10	956	1.25	1018	1.40	1076	1.56	1131	1.71
2700	923	1.23	988	1.39	1048	1.55	1105	1.71	1158	1.87
2800	957	1.37	1020	1.53	1079	1.70	1134	1.87	1186	2.03
2900	991	1.52	1052	1.69	1109	1.86	1163	2.04	1214	2.21
3000	1026	1.68	1085	1.86	1140	2.04	1193	2.22	1243	2.40

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1010	0.95	1072	1.07	1132	1.20	1190	1.33	1246	1.47
1900	1027	1.03	1088	1.16	1146	1.30	1203	1.43	1258	1.57
2000	1047	1.13	1106	1.26	1162	1.40	1218	1.54	1271	1.68
2100	1067	1.23	1124	1.37	1180	1.51	1234	1.65	1286	1.80
2200	1089	1.34	1145	1.48	1199	1.63	1251	1.78	1302	1.93
2300	1111	1.46	1166	1.60	1218	1.76	1269	1.91	1319	2.07
2400	1135	1.59	1188	1.74	1239	1.89	1289	2.05	1338	2.21
2500	1159	1.73	1211	1.88	1261	2.04	1310	2.20	1357	2.37
2600	1184	1.87	1235	2.03	1284	2.20	1331	2.37	—	—
2700	1210	2.03	1259	2.20	1307	2.37	—	—	—	—
2800	1236	2.20	1284	2.37	—	—	—	—	—	—
2900	1263	2.38	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF07 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	651	0.40	739	0.51	817	0.62	889	0.73	957	0.85
1900	683	0.47	767	0.58	843	0.69	912	0.81	978	0.93
2000	715	0.54	796	0.66	869	0.78	937	0.90	1000	1.03
2100	748	0.62	826	0.75	896	0.87	962	1.00	1024	1.13
2200	781	0.71	856	0.84	925	0.97	988	1.10	1048	1.24
2300	815	0.81	888	0.95	954	1.08	1015	1.22	1074	1.36
2400	850	0.92	919	1.06	983	1.20	1043	1.35	1100	1.49
2500	885	1.04	952	1.18	1014	1.33	1072	1.48	1127	1.63
2600	920	1.17	985	1.32	1045	1.47	1101	1.63	1155	1.79
2700	956	1.31	1018	1.47	1076	1.63	1131	1.79	1184	1.95
2800	992	1.46	1052	1.62	1108	1.79	1162	1.96	1213	2.12
2900	1028	1.62	1086	1.79	1141	1.96	1193	2.14	1243	2.31
3000	1064	1.80	1121	1.98	1174	2.15	1225	2.33	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1022	0.97	1083	1.10	1143	1.23	1201	1.36	1256	1.50
1900	1041	1.06	1101	1.19	1159	1.32	1215	1.46	1269	1.60
2000	1061	1.16	1119	1.29	1176	1.43	1230	1.57	1283	1.72
2100	1083	1.26	1140	1.40	1194	1.55	1248	1.69	1299	1.84
2200	1106	1.38	1161	1.52	1214	1.67	1266	1.82	1317	1.98
2300	1130	1.51	1183	1.65	1236	1.81	1286	1.96	1335	2.12
2400	1155	1.64	1207	1.80	1258	1.95	1307	2.11	1355	2.27
2500	1180	1.79	1231	1.95	1281	2.11	1329	2.27	—	—
2600	1207	1.95	1257	2.11	1305	2.27	—	—	—	—
2700	1234	2.11	1283	2.28	—	—	—	—	—	—
2800	1262	2.29	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	409	0.29	493	0.39	567	0.50	636	0.62	700	0.75
2400	422	0.33	503	0.44	576	0.56	642	0.68	704	0.81
2550	436	0.38	515	0.49	585	0.62	650	0.74	710	0.88
2700	450	0.43	527	0.55	595	0.68	658	0.81	717	0.95
2850	465	0.49	539	0.62	606	0.75	667	0.89	724	1.03
3000	480	0.56	552	0.69	617	0.83	676	0.97	732	1.12
3150	496	0.63	566	0.77	629	0.91	687	1.06	741	1.21
3300	511	0.70	579	0.85	641	1.00	698	1.16	751	1.31
3450	527	0.79	593	0.94	653	1.10	709	1.26	761	1.42
3600	543	0.88	608	1.04	666	1.21	721	1.37	772	1.54
3750	560	0.98	622	1.15	680	1.32	733	1.49	783	1.66

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	760	0.88	817	1.01	871	1.16	923	1.30	972	1.45
2400	763	0.94	819	1.09	872	1.23	923	1.38	972	1.54
2550	768	1.02	822	1.16	874	1.32	924	1.47	973	1.63
2700	773	1.10	826	1.25	877	1.40	927	1.56	974	1.73
2850	779	1.18	831	1.34	881	1.50	929	1.66	976	1.83
3000	786	1.27	837	1.43	886	1.60	933	1.77	979	1.94
3150	793	1.37	843	1.54	891	1.70	938	1.88	983	2.06
3300	802	1.48	851	1.65	898	1.82	943	2.00	987	2.18
3450	811	1.59	859	1.76	905	1.94	949	2.12	992	2.31
3600	820	1.71	867	1.89	912	2.07	956	2.26	998	2.45
3750	830	1.84	876	2.02	920	2.21	963	2.40	1005	2.60

LEGEND

Bhp — Brake Horsepower

——— High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	408	0.28	492	0.39	567	0.50	635	0.62	699	0.74
2400	424	0.33	505	0.44	577	0.56	644	0.68	706	0.81
2550	440	0.38	519	0.50	588	0.62	653	0.75	713	0.88
2700	457	0.44	532	0.56	600	0.69	662	0.82	721	0.96
2850	473	0.50	547	0.63	612	0.77	673	0.90	730	1.05
3000	490	0.57	561	0.71	625	0.85	684	0.99	740	1.14
3150	507	0.65	576	0.79	638	0.94	695	1.08	750	1.24
3300	524	0.73	591	0.88	651	1.03	708	1.19	760	1.34
3450	542	0.82	606	0.98	665	1.13	720	1.29	772	1.46
3600	559	0.92	622	1.08	679	1.24	733	1.41	783	1.58
3750	577	1.02	638	1.19	694	1.36	746	1.53	795	1.71

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	760	0.88	817	1.01	871	1.16	923	1.30	972	1.45
2400	765	0.95	820	1.09	874	1.24	924	1.39	973	1.54
2550	770	1.03	825	1.17	877	1.32	927	1.48	975	1.64
2700	777	1.11	830	1.26	881	1.42	930	1.58	977	1.74
2850	784	1.20	836	1.35	886	1.51	934	1.68	981	1.85
3000	793	1.29	843	1.45	892	1.62	939	1.79	985	1.96
3150	801	1.40	851	1.56	899	1.73	945	1.91	990	2.09
3300	811	1.51	859	1.68	906	1.85	951	2.03	995	2.21
3450	821	1.63	868	1.80	914	1.98	958	2.16	1001	2.35
3600	831	1.75	878	1.93	923	2.11	966	2.30	1008	2.49
3750	843	1.89	888	2.07	932	2.26	974	2.45	1016	2.65

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	413	0.29	496	0.39	571	0.51	639	0.63	703	0.75
2400	429	0.34	510	0.45	581	0.57	647	0.69	709	0.82
2550	446	0.39	524	0.51	593	0.63	657	0.76	717	0.89
2700	464	0.45	538	0.57	605	0.70	667	0.83	726	0.97
2850	481	0.52	553	0.65	618	0.78	678	0.92	735	1.06
3000	499	0.59	569	0.72	632	0.86	690	1.01	746	1.16
3150	517	0.67	584	0.81	646	0.95	703	1.10	756	1.26
3300	535	0.75	600	0.90	660	1.05	715	1.21	768	1.37
3450	553	0.85	617	1.00	675	1.16	729	1.32	780	1.48
3600	571	0.95	633	1.11	690	1.27	742	1.44	792	1.61
3750	590	1.06	650	1.23	705	1.40	756	1.57	805	1.74

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	763	0.88	820	1.02	874	1.16	925	1.31	974	1.46
2400	768	0.96	824	1.10	877	1.25	927	1.40	976	1.55
2550	774	1.04	829	1.18	881	1.33	930	1.49	978	1.65
2700	781	1.12	834	1.27	885	1.43	934	1.59	981	1.75
2850	789	1.21	841	1.37	891	1.53	939	1.70	985	1.87
3000	798	1.31	849	1.47	897	1.64	944	1.81	990	1.98
3150	808	1.42	857	1.58	905	1.75	951	1.93	995	2.11
3300	818	1.53	866	1.70	913	1.88	958	2.06	1001	2.24
3450	829	1.65	876	1.83	921	2.01	965	2.19	1008	2.38
3600	840	1.78	886	1.96	931	2.15	974	2.34	1016	2.53
3750	852	1.92	897	2.11	941	2.30	983	2.49	1024	2.69

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	436	0.38	515	0.49	585	0.62	650	0.74	710	0.88
2700	450	0.43	527	0.55	595	0.68	658	0.81	717	0.95
2850	465	0.49	539	0.62	606	0.75	667	0.89	724	1.03
3000	480	0.56	552	0.69	617	0.83	676	0.97	732	1.12
3150	496	0.63	566	0.77	629	0.91	687	1.06	741	1.21
3300	511	0.70	579	0.85	641	1.00	698	1.16	751	1.31
3450	527	0.79	593	0.94	653	1.10	709	1.26	761	1.42
3600	543	0.88	608	1.04	666	1.21	721	1.37	772	1.54
3750	560	0.98	622	1.15	680	1.32	733	1.49	783	1.66
3900	576	1.08	637	1.26	693	1.44	745	1.61	794	1.79
4050	593	1.19	652	1.38	707	1.56	758	1.75	806	1.93
4200	610	1.32	668	1.51	721	1.70	771	1.89	818	2.08

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	768	1.02	822	1.16	874	1.32	924	1.47	973	1.63
2700	773	1.10	826	1.25	877	1.40	927	1.56	974	1.73
2850	779	1.18	831	1.34	881	1.50	929	1.66	976	1.83
3000	786	1.27	837	1.43	886	1.60	933	1.77	979	1.94
3150	793	1.37	843	1.54	891	1.70	938	1.88	983	2.06
3300	802	1.48	851	1.65	898	1.82	943	2.00	987	2.18
3450	811	1.59	859	1.76	905	1.94	949	2.12	992	2.31
3600	820	1.71	867	1.89	912	2.07	956	2.26	998	2.45
3750	830	1.84	876	2.02	920	2.21	963	2.40	1005	2.60
3900	841	1.98	886	2.16	929	2.35	971	2.55	1012	2.75
4050	852	2.12	896	2.31	938	2.51	980	2.71	1020	2.91
4200	863	2.27	906	2.47	948	2.67	989	2.88	1028	3.09

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	440	0.38	519	0.50	588	0.62	653	0.75	713	0.88
2700	457	0.44	532	0.56	600	0.69	662	0.82	721	0.96
2850	473	0.50	547	0.63	612	0.77	673	0.90	730	1.05
3000	490	0.57	561	0.71	625	0.85	684	0.99	740	1.14
3150	507	0.65	576	0.79	638	0.94	695	1.08	750	1.24
3300	524	0.73	591	0.88	651	1.03	708	1.19	760	1.34
3450	542	0.82	606	0.98	665	1.13	720	1.29	772	1.46
3600	559	0.92	622	1.08	679	1.24	733	1.41	783	1.58
3750	577	1.02	638	1.19	694	1.36	746	1.53	795	1.71
3900	594	1.13	654	1.31	708	1.49	759	1.66	808	1.84
4050	612	1.25	670	1.44	723	1.62	773	1.80	821	1.99
4200	630	1.38	686	1.57	738	1.76	787	1.95	834	2.14

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	770	1.03	825	1.17	877	1.32	927	1.48	975	1.64
2700	777	1.11	830	1.26	881	1.42	930	1.58	977	1.74
2850	784	1.20	836	1.35	886	1.51	934	1.68	981	1.85
3000	793	1.29	843	1.45	892	1.62	939	1.79	985	1.96
3150	801	1.40	851	1.56	899	1.73	945	1.91	990	2.09
3300	811	1.51	859	1.68	906	1.85	951	2.03	995	2.21
3450	821	1.63	868	1.80	914	1.98	958	2.16	1001	2.35
3600	831	1.75	878	1.93	923	2.11	966	2.30	1008	2.49
3750	843	1.89	888	2.07	932	2.26	974	2.45	1016	2.65
3900	854	2.03	898	2.22	941	2.41	983	2.61	1024	2.81
4050	866	2.18	909	2.37	951	2.57	992	2.77	1032	2.98
4200	878	2.34	921	2.54	962	2.74	1002	2.95	1041	3.16

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	446	0.39	524	0.51	593	0.63	657	0.76	717	0.89
2700	464	0.45	538	0.57	605	0.70	667	0.83	726	0.97
2850	481	0.52	553	0.65	618	0.78	678	0.92	735	1.06
3000	499	0.59	569	0.72	632	0.86	690	1.01	746	1.16
3150	517	0.67	584	0.81	646	0.95	703	1.10	756	1.26
3300	535	0.75	600	0.90	660	1.05	715	1.21	768	1.37
3450	553	0.85	617	1.00	675	1.16	729	1.32	780	1.48
3600	571	0.95	633	1.11	690	1.27	742	1.44	792	1.61
3750	590	1.06	650	1.23	705	1.40	756	1.57	805	1.74
3900	608	1.18	667	1.35	720	1.53	771	1.71	819	1.89
4050	627	1.30	684	1.49	736	1.67	786	1.85	832	2.04
4200	646	1.44	701	1.63	752	1.82	801	2.01	846	2.20

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	774	1.04	829	1.18	881	1.33	930	1.49	978	1.65
2700	781	1.12	834	1.27	885	1.43	934	1.59	981	1.75
2850	789	1.21	841	1.37	891	1.53	939	1.70	985	1.87
3000	798	1.31	849	1.47	897	1.64	944	1.81	990	1.98
3150	808	1.42	857	1.58	905	1.75	951	1.93	995	2.11
3300	818	1.53	866	1.70	913	1.88	958	2.06	1001	2.24
3450	829	1.65	876	1.83	921	2.01	965	2.19	1008	2.38
3600	840	1.78	886	1.96	931	2.15	974	2.34	1016	2.53
3750	852	1.92	897	2.11	941	2.30	983	2.49	1024	2.69
3900	864	2.07	908	2.26	951	2.46	993	2.65	1033	2.86
4050	877	2.23	920	2.42	962	2.62	1003	2.83	1042	3.03
4200	890	2.40	933	2.60	974	2.80	1013	3.01	1052	3.22

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	502	0.60	571	0.73	634	0.87	693	1.01	748	1.16
3200	525	0.70	592	0.85	652	0.99	709	1.14	762	1.30
3400	549	0.82	613	0.97	671	1.13	726	1.29	777	1.45
3600	573	0.95	634	1.11	691	1.28	743	1.44	793	1.61
3800	597	1.10	656	1.27	711	1.44	762	1.62	810	1.79
4000	621	1.26	678	1.44	731	1.62	781	1.80	828	1.99
4200	645	1.43	700	1.62	752	1.81	800	2.00	846	2.20
4400	669	1.62	723	1.83	772	2.02	819	2.22	864	2.42
4600	694	1.83	745	2.04	794	2.25	839	2.46	883	2.67
4800	719	2.06	768	2.28	815	2.50	860	2.71	902	2.93
5000	743	2.30	791	2.53	837	2.76	880	2.98	922	3.21

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	800	1.32	851	1.48	899	1.64	946	1.82	992	1.99
3200	813	1.46	862	1.63	909	1.80	955	1.98	999	2.16
3400	827	1.62	874	1.79	920	1.97	964	2.15	1007	2.34
3600	841	1.79	887	1.97	932	2.15	975	2.34	1017	2.53
3800	857	1.97	901	2.16	945	2.35	986	2.55	1027	2.75
4000	873	2.18	916	2.37	958	2.56	999	2.77	1039	2.97
4200	889	2.39	932	2.59	973	2.80	1013	3.00	1051	3.22
4400	907	2.63	948	2.83	988	3.04	1027	3.26	1065	3.48
4600	925	2.88	965	3.09	1004	3.31	1042	3.53	—	—
4800	943	3.15	982	3.37	1020	3.59	—	—	—	—
5000	962	3.44	1000	3.67	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive, 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	510	0.61	579	0.75	641	0.89	699	1.03	754	1.18
3200	535	0.72	600	0.87	660	1.01	716	1.16	769	1.32
3400	560	0.84	623	1.00	680	1.15	734	1.31	785	1.48
3600	585	0.98	645	1.14	701	1.31	753	1.47	802	1.65
3800	610	1.14	668	1.31	722	1.48	772	1.65	820	1.83
4000	635	1.30	691	1.48	743	1.66	792	1.85	839	2.03
4200	661	1.49	715	1.68	765	1.87	813	2.06	858	2.25
4400	687	1.69	739	1.89	788	2.09	834	2.29	878	2.49
4600	713	1.91	763	2.12	811	2.33	855	2.53	898	2.74
4800	739	2.15	788	2.37	834	2.58	877	2.80	919	3.02
5000	765	2.41	812	2.63	857	2.86	899	3.08	940	3.31

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	806	1.34	856	1.50	905	1.66	951	1.84	997	2.01
3200	820	1.48	868	1.65	915	1.82	961	2.00	1005	2.18
3400	834	1.64	881	1.82	927	2.00	971	2.18	1014	2.37
3600	850	1.82	896	2.00	940	2.19	983	2.38	1024	2.57
3800	866	2.01	911	2.20	954	2.39	995	2.59	1036	2.79
4000	884	2.22	927	2.42	969	2.61	1009	2.82	1049	3.02
4200	902	2.45	944	2.65	984	2.85	1024	3.06	1062	3.28
4400	920	2.69	961	2.90	1001	3.11	1039	3.33	1077	3.55
4600	939	2.96	979	3.17	1018	3.39	1055	3.61	—	—
4800	959	3.24	998	3.46	1035	3.69	—	—	—	—
5000	979	3.54	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive, 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	514	0.62	583	0.75	645	0.89	702	1.04	757	1.19
3200	540	0.73	605	0.88	665	1.02	720	1.18	773	1.33
3400	565	0.86	628	1.01	685	1.17	739	1.33	790	1.49
3600	591	1.00	651	1.16	706	1.33	758	1.49	808	1.66
3800	617	1.16	675	1.33	728	1.50	778	1.67	826	1.85
4000	643	1.33	699	1.51	750	1.69	799	1.87	845	2.06
4200	670	1.52	723	1.71	773	1.90	820	2.09	865	2.28
4400	696	1.72	748	1.92	796	2.12	842	2.32	885	2.52
4600	723	1.95	772	2.16	819	2.37	864	2.57	906	2.78
4800	749	2.19	797	2.41	843	2.63	886	2.84	927	3.06
5000	776	2.46	823	2.69	867	2.91	909	3.14	949	3.36

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	809	1.35	859	1.51	908	1.67	954	1.85	999	2.02
3200	823	1.50	872	1.66	919	1.84	964	2.01	1008	2.20
3400	839	1.66	886	1.83	931	2.01	975	2.20	1018	2.39
3600	855	1.84	900	2.02	944	2.21	987	2.40	1029	2.59
3800	872	2.04	916	2.22	959	2.42	1000	2.61	1041	2.81
4000	890	2.25	933	2.44	974	2.64	1015	2.85	1054	3.05
4200	908	2.48	950	2.68	990	2.89	1030	3.10	1068	3.31
4400	927	2.73	968	2.94	1007	3.15	1046	3.37	1083	3.59
4600	947	3.00	987	3.21	1025	3.43	1062	3.65	—	—
4800	967	3.28	1006	3.51	—	—	—	—	—	—
5000	988	3.59	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive, 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGD14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	591	1.06	651	1.23	706	1.40	757	1.57	806	1.75
3950	615	1.22	672	1.40	726	1.57	776	1.75	823	1.94
4150	639	1.39	695	1.58	746	1.76	795	1.95	841	2.14
4350	663	1.58	717	1.77	767	1.97	814	2.17	859	2.36
4550	688	1.78	740	1.99	788	2.19	834	2.40	878	2.60
4750	712	2.00	763	2.22	810	2.43	855	2.65	897	2.86
4950	737	2.24	786	2.47	832	2.69	875	2.91	917	3.14
5150	762	2.50	809	2.73	853	2.97	896	3.20	937	3.43
5350	787	2.77	832	3.02	876	3.26	917	3.50	957	3.75
5550	811	3.07	856	3.33	898	3.58	938	3.83	977	4.08
5750	836	3.39	879	3.65	920	3.92	960	4.18	998	4.44
5950	861	3.72	903	4.00	943	4.28	982	4.55	1019	4.81
6150	886	4.09	927	4.37	966	4.66	1004	4.94	1040	5.21
6250	899	4.28	939	4.57	977	4.85	1015	5.14	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	853	1.93	898	2.11	941	2.30	983	2.49	1025	2.69
3950	869	2.12	912	2.31	955	2.51	996	2.71	1036	2.91
4150	885	2.34	928	2.53	969	2.74	1009	2.94	1048	3.15
4350	902	2.57	944	2.77	984	2.98	1023	3.19	1061	3.41
4550	920	2.81	961	3.03	1000	3.24	1038	3.46	1075	3.68
4750	938	3.08	978	3.30	1016	3.52	1053	3.75	1090	3.98
4950	957	3.36	996	3.59	1033	3.82	1069	4.05	1105	4.29
5150	976	3.67	1014	3.90	1050	4.14	1086	4.38	1121	4.62
5350	995	3.99	1032	4.23	1068	4.48	1103	4.72	1137	4.97
5550	1015	4.33	1051	4.58	1086	4.84	1120	5.09	—	—
5750	1035	4.70	1070	4.96	1105	5.22	—	—	—	—
5950	1055	5.08	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive, 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGE14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	604	1.10	662	1.26	717	1.43	767	1.61	816	1.78
3950	629	1.26	686	1.44	738	1.62	787	1.80	834	1.98
4150	655	1.44	709	1.63	760	1.82	808	2.00	853	2.20
4350	681	1.64	733	1.83	782	2.03	829	2.23	873	2.43
4550	706	1.85	757	2.06	805	2.26	850	2.47	893	2.68
4750	732	2.09	782	2.30	828	2.52	872	2.73	914	2.95
4950	759	2.34	806	2.56	851	2.79	894	3.01	935	3.24
5150	785	2.61	831	2.85	874	3.08	916	3.31	956	3.54
5350	811	2.91	856	3.15	898	3.39	939	3.63	978	3.88
5550	838	3.22	881	3.48	922	3.73	961	3.98	999	4.23
5750	864	3.56	906	3.82	946	4.08	985	4.34	1022	4.60
5950	891	3.92	931	4.19	970	4.46	1008	4.73	1044	5.00
6150	917	4.31	957	4.59	995	4.87	1032	5.15	—	—
6250	931	4.51	970	4.80	1007	5.08	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	862	1.96	907	2.15	950	2.34	992	2.53	1033	2.73
3950	879	2.17	923	2.36	965	2.56	1006	2.76	1045	2.96
4150	897	2.39	939	2.59	980	2.79	1020	3.00	1059	3.21
4350	915	2.63	957	2.84	996	3.05	1035	3.26	1073	3.48
4550	934	2.89	975	3.10	1013	3.32	1051	3.54	1088	3.76
4750	954	3.16	993	3.39	1031	3.61	1068	3.84	1104	4.07
4950	974	3.46	1012	3.69	1049	3.92	1085	4.16	1120	4.39
5150	994	3.78	1032	4.02	1068	4.25	1103	4.50	1137	4.74
5350	1015	4.12	1051	4.36	1087	4.61	1121	4.86	1155	5.11
5550	1036	4.48	1072	4.73	1106	4.99	1140	5.24	—	—
5750	1058	4.86	1092	5.12	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive, 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 48PGF14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	611	1.12	669	1.28	723	1.45	773	1.63	821	1.80
3950	637	1.28	693	1.46	745	1.64	794	1.82	840	2.01
4150	663	1.47	717	1.66	767	1.84	815	2.03	860	2.22
4350	690	1.67	742	1.87	790	2.06	836	2.26	880	2.46
4550	716	1.89	766	2.10	813	2.30	858	2.51	901	2.72
4750	743	2.13	791	2.35	837	2.56	880	2.77	922	2.99
4950	770	2.39	816	2.62	861	2.84	903	3.06	944	3.29
5150	796	2.67	842	2.90	885	3.14	926	3.37	965	3.60
5350	823	2.97	867	3.22	909	3.46	949	3.70	988	3.94
5550	850	3.29	893	3.55	933	3.80	972	4.05	1010	4.30
5750	877	3.64	918	3.90	958	4.16	996	4.42	1033	4.68
5950	904	4.01	944	4.28	983	4.55	1020	4.82	1056	5.09
6150	931	4.41	970	4.69	1008	4.97	1044	5.24	—	—
6250	945	4.61	983	4.90	1020	5.18	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	868	1.99	912	2.17	955	2.36	997	2.56	1038	2.76
3950	885	2.19	928	2.39	970	2.58	1011	2.79	1051	2.99
4150	904	2.42	946	2.62	986	2.82	1026	3.03	1065	3.24
4350	923	2.66	963	2.87	1003	3.08	1042	3.30	1079	3.52
4550	942	2.93	982	3.14	1021	3.36	1058	3.58	1095	3.81
4750	962	3.21	1001	3.43	1039	3.66	1075	3.88	1111	4.12
4950	983	3.51	1020	3.74	1057	3.97	1093	4.21	1128	4.45
5150	1004	3.84	1040	4.07	1076	4.31	1111	4.56	1146	4.80
5350	1025	4.18	1061	4.43	1096	4.67	1130	4.92	1164	5.18
5550	1046	4.55	1082	4.80	1116	5.06	—	—	—	—
5750	1068	4.94	1103	5.20	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive, 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG03 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	402	0.05	549	0.10	664	0.15	761	0.21	847	0.27
650	407	0.06	553	0.11	667	0.17	764	0.23	850	0.29
700	413	0.06	556	0.12	670	0.18	767	0.24	853	0.31
750	418	0.07	560	0.13	673	0.19	770	0.25	856	0.32
800	425	0.07	565	0.13	677	0.20	773	0.27	859	0.34
850	431	0.08	569	0.14	681	0.21	776	0.28	862	0.36
900	438	0.09	574	0.15	685	0.23	780	0.30	865	0.38
950	446	0.10	579	0.17	689	0.24	784	0.32	868	0.40
1000	454	0.11	585	0.18	693	0.25	787	0.33	872	0.42

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	925	0.34	997	0.41	1064	0.48	1126	0.55	1186	0.63
650	928	0.36	999	0.43	1066	0.50	1129	0.58	1188	0.66
700	930	0.38	1002	0.45	1069	0.53	1131	0.61	1191	0.69
750	933	0.40	1005	0.47	1071	0.55	1134	0.63	1193	0.72
800	936	0.42	1007	0.49	1074	0.58	1136	0.66	1196	0.75
850	939	0.44	1010	0.52	1077	0.60	1139	0.69	1198	0.78
900	942	0.46	1013	0.54	1079	0.63	1142	0.72	1201	0.81
950	945	0.48	1016	0.57	1082	0.66	1145	0.75	1204	0.84
1000	948	0.50	1019	0.59	1085	0.68	1147	0.78	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 656 to 1001 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG04 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	438	0.09	574	0.15	685	0.23	780	0.30	865	0.38
950	446	0.10	579	0.17	689	0.24	784	0.32	868	0.40
1000	454	0.11	585	0.18	693	0.25	787	0.33	872	0.42
1050	462	0.12	590	0.19	698	0.27	791	0.35	875	0.44
1100	471	0.13	596	0.20	703	0.28	796	0.37	879	0.46
1150	480	0.14	603	0.21	708	0.30	800	0.39	883	0.48
1200	489	0.15	610	0.23	713	0.32	805	0.41	887	0.50
1250	499	0.16	617	0.24	719	0.33	809	0.43	891	0.53
1300	509	0.18	624	0.26	725	0.35	814	0.45	896	0.55
1350	519	0.19	632	0.28	731	0.37	820	0.47	900	0.57
1400	529	0.21	639	0.29	737	0.39	825	0.49	905	0.60
1450	540	0.22	648	0.31	744	0.41	831	0.52	910	0.63
1500	551	0.24	656	0.33	751	0.43	837	0.54	915	0.65

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	942	0.46	1013	0.54	1079	0.63	1142	0.72	1201	0.81
950	945	0.48	1016	0.57	1082	0.66	1145	0.75	1204	0.84
1000	948	0.50	1019	0.59	1085	0.68	1147	0.78	—	—
1050	952	0.53	1022	0.62	1088	0.71	1150	0.81	—	—
1100	955	0.55	1026	0.65	1091	0.74	1153	0.84	—	—
1150	959	0.57	1029	0.67	1095	0.77	—	—	—	—
1200	962	0.60	1032	0.70	1098	0.80	—	—	—	—
1250	966	0.63	1036	0.73	1101	0.83	—	—	—	—
1300	970	0.65	1040	0.76	—	—	—	—	—	—
1350	975	0.68	1044	0.79	—	—	—	—	—	—
1400	979	0.71	1048	0.82	—	—	—	—	—	—
1450	984	0.74	1052	0.85	—	—	—	—	—	—
1500	988	0.77	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG05 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	492	0.15	604	0.22	701	0.31	790	0.39	873	0.49
1300	513	0.18	620	0.26	714	0.34	800	0.43	880	0.53
1400	534	0.21	638	0.29	729	0.38	812	0.48	889	0.58
1500	557	0.24	657	0.33	745	0.43	825	0.53	900	0.63
1600	580	0.28	677	0.38	762	0.48	839	0.58	912	0.69
1700	603	0.33	697	0.43	779	0.53	855	0.64	926	0.75
1800	627	0.38	718	0.48	798	0.59	871	0.70	940	0.82
1900	651	0.43	739	0.54	817	0.65	889	0.77	956	0.89
2000	675	0.49	761	0.61	837	0.72	907	0.85	972	0.97

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	950	0.58	1023	0.69	1092	0.79	1157	0.90	1219	1.02
1300	955	0.63	1027	0.74	1094	0.85	1158	0.96	1220	1.08
1400	962	0.68	1032	0.79	1098	0.91	1161	1.03	1222	1.15
1500	971	0.74	1039	0.85	1103	0.97	1165	1.09	1225	1.22
1600	981	0.80	1047	0.92	1110	1.04	1171	1.17	1229	1.30
1700	993	0.87	1057	0.99	1118	1.11	1178	1.24	1235	1.38
1800	1005	0.94	1068	1.06	1128	1.19	1186	1.33	1242	1.46
1900	1019	1.02	1080	1.14	1139	1.28	1196	1.41	1251	1.56
2000	1034	1.10	1094	1.23	1151	1.37	1206	1.51	1260	1.65

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG06 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	568	0.25	667	0.34	753	0.44	833	0.54	908	0.64
1600	592	0.29	687	0.39	771	0.49	848	0.59	920	0.70
1700	616	0.34	708	0.44	789	0.54	864	0.65	934	0.76
1800	641	0.39	730	0.50	809	0.61	881	0.72	950	0.83
1900	665	0.45	752	0.56	829	0.67	900	0.79	966	0.91
2000	690	0.51	775	0.63	850	0.75	918	0.87	983	0.99
2100	716	0.57	798	0.70	871	0.82	938	0.95	1001	1.08
2200	742	0.65	821	0.78	892	0.91	958	1.04	1020	1.18
2300	768	0.73	845	0.86	915	1.00	979	1.14	1039	1.28
2400	794	0.81	869	0.96	937	1.10	1000	1.24	1059	1.38
2500	820	0.91	894	1.05	960	1.20	1021	1.35	1079	1.50

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	978	0.75	1046	0.87	1110	0.98	1172	1.11	1231	1.23
1600	989	0.81	1055	0.93	1117	1.05	1178	1.18	1236	1.31
1700	1001	0.88	1065	1.00	1126	1.13	1185	1.26	1242	1.39
1800	1015	0.96	1077	1.08	1136	1.21	1194	1.35	1250	1.48
1900	1029	1.04	1090	1.16	1148	1.30	1204	1.44	1259	1.58
2000	1045	1.12	1104	1.26	1161	1.39	1216	1.53	1269	1.68
2100	1061	1.21	1119	1.35	1174	1.49	1228	1.64	1280	1.79
2200	1078	1.31	1135	1.45	1189	1.60	1241	1.75	1293	1.90
2300	1096	1.42	1151	1.57	1204	1.71	1256	1.87	1306	2.02
2400	1115	1.53	1169	1.68	1221	1.84	1271	1.99	1320	2.15
2500	1134	1.65	1187	1.81	1238	1.97	1287	2.13	1335	2.29

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 978 rpm for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG07 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	654	0.41	742	0.51	819	0.62	891	0.73	959	0.85
1900	680	0.46	765	0.58	840	0.69	910	0.81	976	0.93
2000	706	0.53	788	0.65	862	0.77	930	0.89	994	1.01
2100	732	0.60	812	0.72	883	0.85	950	0.97	1012	1.10
2200	758	0.67	836	0.80	906	0.93	970	1.07	1031	1.20
2300	785	0.76	860	0.89	929	1.03	992	1.17	1051	1.31
2400	812	0.85	885	0.99	952	1.13	1014	1.27	1072	1.42
2500	839	0.94	910	1.09	975	1.24	1036	1.39	1093	1.54
2600	866	1.05	936	1.20	999	1.36	1058	1.51	1114	1.66
2700	894	1.16	961	1.32	1023	1.48	1081	1.64	1136	1.80
2800	921	1.28	987	1.45	1048	1.61	1105	1.78	1158	1.94
2900	949	1.41	1013	1.58	1073	1.75	1128	1.92	1181	2.10
3000	977	1.54	1039	1.72	1098	1.90	1152	2.08	1204	2.26

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1023	0.97	1085	1.10	1145	1.23	1202	1.36	1258	1.50
1900	1039	1.06	1099	1.19	1157	1.32	1213	1.46	1267	1.60
2000	1055	1.14	1113	1.28	1170	1.42	1225	1.56	1278	1.70
2100	1072	1.24	1129	1.38	1184	1.52	1238	1.67	1290	1.81
2200	1090	1.34	1145	1.48	1199	1.63	1252	1.78	1303	1.93
2300	1108	1.45	1163	1.60	1215	1.75	1267	1.90	1316	2.06
2400	1127	1.57	1181	1.72	1232	1.87	1282	2.03	1331	2.19
2500	1147	1.69	1199	1.85	1250	2.01	1299	2.17	1347	2.33
2600	1168	1.82	1219	1.98	1268	2.15	1316	2.31	—	—
2700	1188	1.96	1239	2.13	1287	2.30	—	—	—	—
2800	1210	2.11	1259	2.28	—	—	—	—	—	—
2900	1231	2.27	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG08 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	439	0.32	519	0.43	592	0.54	659	0.66	721	0.79
2400	455	0.37	532	0.48	602	0.60	667	0.73	728	0.86
2550	471	0.43	546	0.55	613	0.67	676	0.80	735	0.94
2700	488	0.49	560	0.61	625	0.74	686	0.88	743	1.02
2850	505	0.56	574	0.69	638	0.82	697	0.96	753	1.11
3000	522	0.63	589	0.77	651	0.91	708	1.05	763	1.21
3150	539	0.71	605	0.86	664	1.00	720	1.15	773	1.31
3300	557	0.80	620	0.95	679	1.10	733	1.26	785	1.42
3450	575	0.90	636	1.06	693	1.21	746	1.37	797	1.54
3600	593	1.00	653	1.17	708	1.33	760	1.50	809	1.67
3750	611	1.12	669	1.29	723	1.46	774	1.63	822	1.81

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	780	0.92	836	1.06	889	1.21	940	1.35	989	1.51
2400	785	1.00	840	1.14	892	1.29	942	1.44	990	1.60
2550	791	1.08	845	1.23	896	1.38	945	1.54	993	1.70
2700	798	1.17	851	1.32	901	1.48	949	1.64	996	1.81
2850	806	1.26	857	1.42	906	1.58	954	1.75	999	1.92
3000	815	1.36	865	1.52	913	1.69	959	1.86	1004	2.04
3150	824	1.47	873	1.64	920	1.81	965	1.99	1009	2.17
3300	834	1.59	882	1.76	928	1.94	972	2.12	1015	2.30
3450	845	1.71	891	1.89	936	2.07	980	2.26	1022	2.45
3600	856	1.85	902	2.03	946	2.21	988	2.40	1030	2.60
3750	868	1.99	912	2.17	955	2.36	997	2.56	1038	2.76

LEGEND

Bhp — Brake Horsepower

——— High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG09 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	471	0.43	546	0.55	613	0.67	676	0.80	735	0.94
2700	488	0.49	560	0.61	625	0.74	686	0.88	743	1.02
2850	505	0.56	574	0.69	638	0.82	697	0.96	753	1.11
3000	522	0.63	589	0.77	651	0.91	708	1.05	763	1.21
3150	539	0.71	605	0.86	664	1.00	720	1.15	773	1.31
3300	557	0.80	620	0.95	679	1.10	733	1.26	785	1.42
3450	575	0.90	636	1.06	693	1.21	746	1.37	797	1.54
3600	593	1.00	653	1.17	708	1.33	760	1.50	809	1.67
3750	611	1.12	669	1.29	723	1.46	774	1.63	822	1.81
3900	630	1.24	686	1.41	739	1.59	788	1.77	835	1.95
4050	648	1.37	703	1.55	754	1.73	803	1.92	849	2.11
4200	667	1.51	721	1.70	771	1.89	818	2.08	863	2.27

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	791	1.08	845	1.23	896	1.38	945	1.54	993	1.70
2700	798	1.17	851	1.32	901	1.48	949	1.64	996	1.81
2850	806	1.26	857	1.42	906	1.58	954	1.75	999	1.92
3000	815	1.36	865	1.52	913	1.69	959	1.86	1004	2.04
3150	824	1.47	873	1.64	920	1.81	965	1.99	1009	2.17
3300	834	1.59	882	1.76	928	1.94	972	2.12	1015	2.30
3450	845	1.71	891	1.89	936	2.07	980	2.26	1022	2.45
3600	856	1.85	902	2.03	946	2.21	988	2.40	1030	2.60
3750	868	1.99	912	2.17	955	2.36	997	2.56	1038	2.76
3900	880	2.14	924	2.33	966	2.52	1007	2.72	1047	2.93
4050	893	2.30	936	2.49	977	2.70	1017	2.90	1056	3.11
4200	906	2.47	948	2.67	988	2.88	1028	3.09	1066	3.30

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG012 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	533	0.65	599	0.79	660	0.93	717	1.08	771	1.23
3200	557	0.77	620	0.91	679	1.06	734	1.21	786	1.37
3400	581	0.90	642	1.05	699	1.21	751	1.37	802	1.53
3600	606	1.04	665	1.20	719	1.36	770	1.53	819	1.71
3800	631	1.20	687	1.37	740	1.54	789	1.71	837	1.89
4000	656	1.37	711	1.55	761	1.73	809	1.91	855	2.10
4200	682	1.56	734	1.75	783	1.94	830	2.13	874	2.32
4400	707	1.77	758	1.96	806	2.16	851	2.36	894	2.57
4600	733	1.99	782	2.20	828	2.41	872	2.62	914	2.83
4800	759	2.24	806	2.45	851	2.67	894	2.89	935	3.11
5000	785	2.50	831	2.73	875	2.95	916	3.18	956	3.41

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	822	1.39	872	1.55	920	1.72	966	1.89	1011	2.07
3200	836	1.54	884	1.71	930	1.88	975	2.06	1019	2.24
3400	850	1.70	897	1.88	942	2.06	985	2.24	1028	2.43
3600	866	1.88	911	2.06	955	2.25	997	2.44	1038	2.64
3800	882	2.08	926	2.27	968	2.46	1010	2.66	1050	2.86
4000	899	2.29	942	2.49	983	2.69	1023	2.89	1063	3.10
4200	917	2.52	959	2.72	999	2.93	1038	3.14	1076	3.36
4400	936	2.77	976	2.98	1015	3.19	1054	3.41	1091	3.63
4600	955	3.04	994	3.26	1033	3.48	1070	3.70	—	—
4800	975	3.33	1013	3.55	—	—	—	—	—	—
5000	995	3.63	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG014 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	625	1.15	682	1.32	735	1.49	785	1.67	832	1.85
3950	650	1.32	705	1.50	756	1.68	804	1.86	851	2.05
4150	675	1.51	728	1.70	778	1.88	825	2.07	870	2.27
4350	701	1.71	752	1.91	800	2.11	846	2.30	889	2.50
4550	727	1.93	776	2.14	823	2.34	867	2.55	909	2.76
4750	753	2.17	800	2.39	846	2.60	889	2.82	930	3.03
4950	779	2.43	825	2.66	869	2.88	911	3.10	951	3.33
5150	805	2.71	850	2.95	892	3.18	933	3.41	972	3.64
5350	831	3.01	875	3.26	916	3.50	956	3.74	994	3.98
5550	858	3.34	900	3.59	940	3.84	979	4.09	1016	4.34
5750	884	3.68	925	3.95	965	4.21	1002	4.47	1039	4.73
5950	911	4.05	951	4.33	989	4.60	1026	4.86	1062	5.13
6150	938	4.45	976	4.73	1014	5.01	—	—	—	—
6250	951	4.66	989	4.94	1026	5.23	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	878	2.03	922	2.22	965	2.41	1006	2.60	1047	2.80
3950	895	2.24	938	2.43	979	2.63	1020	2.83	1059	3.04
4150	913	2.46	954	2.66	995	2.87	1034	3.08	1073	3.29
4350	931	2.71	972	2.91	1011	3.13	1050	3.34	1087	3.56
4550	950	2.97	990	3.18	1028	3.40	1066	3.63	1102	3.85
4750	970	3.25	1008	3.47	1046	3.70	1082	3.93	1118	4.16
4950	990	3.56	1028	3.79	1064	4.02	1100	4.25	1135	4.49
5150	1010	3.88	1047	4.12	1083	4.36	1118	4.60	1152	4.85
5350	1031	4.23	1067	4.47	1102	4.72	1136	4.97	1170	5.22
5550	1053	4.59	1088	4.85	1122	5.10	—	—	—	—
5750	1074	4.99	1109	5.25	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG03 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	382	0.05	527	0.09	641	0.14	738	0.20	824	0.26
650	386	0.05	529	0.10	643	0.15	739	0.21	825	0.27
700	390	0.06	532	0.11	644	0.16	741	0.22	826	0.28
750	395	0.06	534	0.11	646	0.17	742	0.23	827	0.30
800	401	0.07	537	0.12	648	0.18	744	0.25	828	0.31
850	407	0.07	541	0.13	651	0.19	746	0.26	830	0.33
900	413	0.08	544	0.14	653	0.20	748	0.27	832	0.35
950	420	0.09	549	0.15	656	0.22	750	0.29	833	0.36
1000	427	0.09	553	0.16	659	0.23	752	0.30	835	0.38

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
600	902	0.32	973	0.38	1040	0.45	1102	0.52	1162	0.60
650	902	0.33	974	0.40	1040	0.47	1103	0.55	1162	0.62
700	903	0.35	975	0.42	1041	0.49	1104	0.57	1163	0.65
750	904	0.37	976	0.44	1042	0.52	1104	0.59	1164	0.67
800	906	0.39	977	0.46	1043	0.54	1105	0.62	1164	0.70
850	907	0.40	978	0.48	1044	0.56	1106	0.64	1165	0.73
900	908	0.42	979	0.50	1045	0.58	1107	0.67	1166	0.75
950	910	0.44	980	0.52	1046	0.61	1108	0.69	1167	0.78
1000	912	0.46	982	0.54	1048	0.63	1110	0.72	1168	0.81

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 658 to 1001 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG04 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	413	0.08	544	0.14	653	0.20	748	0.27	832	0.35
950	420	0.09	549	0.15	656	0.22	750	0.29	833	0.36
1000	427	0.09	553	0.16	659	0.23	752	0.30	835	0.38
1050	435	0.10	558	0.17	663	0.24	755	0.32	838	0.40
1100	443	0.11	563	0.18	667	0.25	758	0.33	840	0.42
1150	451	0.12	569	0.19	671	0.27	761	0.35	843	0.43
1200	460	0.13	575	0.20	675	0.28	764	0.37	846	0.45
1250	469	0.14	581	0.22	680	0.30	768	0.38	849	0.47
1300	478	0.16	587	0.23	685	0.31	772	0.40	852	0.49
1350	488	0.17	594	0.25	690	0.33	776	0.42	855	0.51
1400	498	0.18	602	0.26	695	0.35	781	0.44	859	0.54
1450	508	0.20	609	0.28	701	0.37	785	0.46	863	0.56
1500	518	0.21	617	0.30	707	0.39	790	0.48	867	0.58

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	908	0.42	979	0.50	1045	0.58	1107	0.67	1166	0.75
950	910	0.44	980	0.52	1046	0.61	1108	0.69	1167	0.78
1000	912	0.46	982	0.54	1048	0.63	1110	0.72	1168	0.81
1050	913	0.48	983	0.57	1049	0.66	1111	0.75	1169	0.84
1100	915	0.50	985	0.59	1051	0.68	1112	0.77	—	—
1150	918	0.52	987	0.61	1052	0.71	1114	0.80	—	—
1200	920	0.54	989	0.64	1054	0.73	1115	0.83	—	—
1250	923	0.57	992	0.66	1056	0.76	—	—	—	—
1300	925	0.59	994	0.69	1058	0.79	—	—	—	—
1350	928	0.61	997	0.71	1061	0.82	—	—	—	—
1400	932	0.64	999	0.74	1063	0.85	—	—	—	—
1450	935	0.66	1002	0.77	—	—	—	—	—	—
1500	938	0.69	1005	0.80	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 482 to 736 rpm for low range motor/drive and 796 to 1128 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 0.85 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG05 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	422	0.11	548	0.19	652	0.26	745	0.35	831	0.44
1300	439	0.13	561	0.21	662	0.29	752	0.38	835	0.47
1400	457	0.16	577	0.24	674	0.33	761	0.42	842	0.51
1500	477	0.19	593	0.27	688	0.37	773	0.46	851	0.56
1600	498	0.22	611	0.31	704	0.41	786	0.51	862	0.61
1700	521	0.25	630	0.35	720	0.46	801	0.56	875	0.67
1800	545	0.29	650	0.40	738	0.51	817	0.62	889	0.73
1900	569	0.34	672	0.45	757	0.57	834	0.68	904	0.80
2000	595	0.39	694	0.51	777	0.63	852	0.75	921	0.87

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	911	0.53	986	0.63	1056	0.74	1123	0.85	1187	0.96
1300	913	0.57	986	0.68	1056	0.78	1122	0.90	1185	1.01
1400	918	0.62	989	0.72	1058	0.84	1123	0.95	1185	1.07
1500	925	0.67	995	0.78	1061	0.89	1125	1.01	1186	1.14
1600	934	0.72	1002	0.84	1067	0.95	1129	1.08	1189	1.21
1700	944	0.78	1010	0.90	1074	1.02	1135	1.15	1194	1.28
1800	956	0.85	1021	0.97	1083	1.09	1143	1.23	1200	1.36
1900	970	0.92	1033	1.04	1094	1.17	1152	1.31	1208	1.45
2000	985	1.00	1047	1.13	1106	1.26	1162	1.40	1217	1.54

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 596 to 910 rpm for low range motor/drive and 828 to 1173 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG06 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	491	0.19	604	0.28	697	0.37	781	0.47	859	0.57
1600	513	0.23	623	0.32	714	0.42	795	0.52	871	0.62
1700	537	0.27	643	0.37	731	0.47	810	0.57	884	0.68
1800	561	0.31	664	0.42	750	0.52	827	0.63	899	0.75
1900	586	0.36	686	0.47	770	0.58	845	0.70	915	0.82
2000	613	0.41	709	0.53	790	0.65	864	0.77	932	0.89
2100	640	0.47	732	0.60	812	0.72	884	0.85	950	0.97
2200	667	0.54	757	0.67	834	0.80	904	0.93	969	1.06
2300	695	0.61	782	0.75	857	0.89	926	1.02	989	1.16
2400	724	0.69	807	0.84	881	0.98	948	1.12	1010	1.26
2500	753	0.78	833	0.93	905	1.08	971	1.23	1032	1.38

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	932	0.68	1002	0.79	1068	0.91	1132	1.03	1192	1.15
1600	942	0.73	1009	0.85	1074	0.97	1136	1.09	1196	1.22
1700	953	0.80	1019	0.91	1082	1.04	1143	1.17	1201	1.30
1800	966	0.86	1030	0.99	1092	1.11	1151	1.24	1208	1.38
1900	980	0.94	1043	1.06	1103	1.19	1161	1.33	1217	1.47
2000	996	1.02	1057	1.15	1115	1.28	1172	1.42	1227	1.56
2100	1012	1.11	1072	1.24	1129	1.38	1184	1.52	1238	1.67
2200	1030	1.20	1088	1.34	1144	1.48	1198	1.63	1251	1.78
2300	1049	1.30	1106	1.44	1160	1.59	1213	1.74	1265	1.89
2400	1068	1.41	1124	1.56	1178	1.71	1229	1.86	1279	2.02
2500	1089	1.53	1143	1.68	1196	1.84	1246	1.99	1295	2.16

LEGEND

Bhp — Brake Horsepower

Low Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 978 for low range motor/drive and 929 to 1261 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 0.85 (single phase) and 2.40 (3 phase) for low range motor/drive and 1.60 (single phase) and 2.40 (3 phase) for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG07 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	577	0.32	677	0.43	761	0.54	838	0.65	908	0.76
1900	603	0.38	700	0.49	782	0.60	856	0.72	925	0.83
2000	630	0.43	723	0.55	803	0.67	876	0.79	943	0.91
2100	658	0.49	748	0.62	826	0.74	896	0.87	962	1.00
2200	686	0.56	773	0.70	849	0.83	918	0.96	981	1.09
2300	715	0.64	798	0.78	872	0.92	940	1.05	1002	1.19
2400	744	0.72	825	0.87	897	1.01	963	1.15	1024	1.30
2500	773	0.82	852	0.97	922	1.12	986	1.26	1046	1.41
2600	803	0.92	879	1.07	947	1.23	1010	1.38	1069	1.54
2700	834	1.03	907	1.19	974	1.35	1035	1.51	1092	1.67
2800	864	1.14	935	1.31	1000	1.48	1060	1.65	1116	1.81
2900	895	1.27	964	1.45	1027	1.62	1086	1.79	1141	1.96
3000	927	1.41	993	1.59	1055	1.77	1112	1.95	1165	2.12

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	975	0.88	1039	1.00	1100	1.13	1159	1.26	1216	1.40
1900	990	0.96	1052	1.08	1112	1.21	1169	1.35	1225	1.49
2000	1006	1.04	1067	1.17	1125	1.31	1181	1.44	1236	1.59
2100	1024	1.13	1083	1.26	1139	1.40	1194	1.55	1248	1.69
2200	1042	1.23	1100	1.37	1155	1.51	1209	1.66	1261	1.81
2300	1061	1.33	1118	1.47	1172	1.62	1224	1.77	1275	1.93
2400	1081	1.44	1137	1.59	1190	1.74	1241	1.90	1291	2.06
2500	1102	1.56	1156	1.72	1208	1.87	1258	2.03	1307	2.20
2600	1124	1.69	1177	1.85	1228	2.01	1277	2.18	1325	2.34
2700	1146	1.83	1198	1.99	1248	2.16	1296	2.33	—	—
2800	1169	1.98	1220	2.15	1269	2.32	—	—	—	—
2900	1193	2.14	1242	2.31	—	—	—	—	—	—
3000	1217	2.30	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 796 to 1128 rpm for low range motor/drive and 1150 to 1438 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	381	0.26	469	0.36	546	0.47	616	0.58	682	0.71
2400	395	0.30	480	0.41	555	0.52	623	0.64	686	0.77
2550	408	0.34	491	0.46	564	0.58	630	0.70	691	0.83
2700	422	0.39	503	0.51	573	0.64	638	0.77	698	0.91
2850	437	0.45	515	0.58	583	0.71	646	0.84	705	0.98
3000	451	0.51	527	0.64	594	0.78	655	0.92	712	1.07
3150	466	0.57	540	0.72	605	0.86	665	1.00	721	1.15
3300	481	0.64	553	0.79	617	0.94	675	1.09	730	1.25
3450	496	0.72	566	0.88	628	1.03	686	1.19	739	1.35
3600	512	0.80	579	0.97	640	1.13	696	1.29	749	1.46
3750	527	0.89	593	1.07	653	1.24	708	1.41	759	1.58

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	743	0.84	801	0.97	856	1.11	908	1.26	958	1.41
2400	746	0.90	803	1.04	857	1.19	908	1.34	957	1.49
2550	750	0.97	805	1.12	858	1.27	909	1.42	958	1.58
2700	755	1.05	809	1.20	861	1.35	911	1.51	958	1.67
2850	760	1.13	813	1.28	864	1.44	913	1.60	960	1.77
3000	767	1.22	818	1.37	868	1.54	916	1.70	962	1.88
3150	774	1.31	824	1.47	873	1.64	920	1.81	966	1.99
3300	781	1.41	831	1.58	879	1.75	925	1.92	969	2.11
3450	790	1.52	838	1.69	885	1.86	930	2.04	974	2.23
3600	799	1.63	846	1.81	892	1.99	936	2.17	979	2.36
3750	808	1.75	854	1.93	899	2.12	943	2.31	985	2.50

LEGEND

Bhp — Brake Horsepower

——— High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	408	0.34	491	0.46	564	0.58	630	0.70	691	0.83
2700	422	0.39	503	0.51	573	0.64	638	0.77	698	0.91
2850	437	0.45	515	0.58	583	0.71	646	0.84	705	0.98
3000	451	0.51	527	0.64	594	0.78	655	0.92	712	1.07
3150	466	0.57	540	0.72	605	0.86	665	1.00	721	1.15
3300	481	0.64	553	0.79	617	0.94	675	1.09	730	1.25
3450	496	0.72	566	0.88	628	1.03	686	1.19	739	1.35
3600	512	0.80	579	0.97	640	1.13	696	1.29	749	1.46
3750	527	0.89	593	1.07	653	1.24	708	1.41	759	1.58
3900	543	0.99	607	1.17	665	1.35	719	1.52	770	1.70
4050	559	1.09	621	1.28	678	1.47	731	1.65	780	1.83
4200	575	1.20	635	1.40	691	1.59	743	1.78	792	1.97

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	750	0.97	805	1.12	858	1.27	909	1.42	958	1.58
2700	755	1.05	809	1.20	861	1.35	911	1.51	958	1.67
2850	760	1.13	813	1.28	864	1.44	913	1.60	960	1.77
3000	767	1.22	818	1.37	868	1.54	916	1.70	962	1.88
3150	774	1.31	824	1.47	873	1.64	920	1.81	966	1.99
3300	781	1.41	831	1.58	879	1.75	925	1.92	969	2.11
3450	790	1.52	838	1.69	885	1.86	930	2.04	974	2.23
3600	799	1.63	846	1.81	892	1.99	936	2.17	979	2.36
3750	808	1.75	854	1.93	899	2.12	943	2.31	985	2.50
3900	817	1.88	863	2.07	907	2.26	950	2.45	991	2.65
4050	827	2.02	872	2.21	916	2.40	958	2.60	998	2.80
4200	838	2.16	882	2.36	925	2.56	966	2.76	1006	2.97

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	464	0.53	538	0.66	604	0.80	664	0.94	721	1.09
3200	484	0.62	556	0.77	619	0.91	678	1.06	733	1.21
3400	505	0.72	574	0.88	636	1.03	692	1.19	746	1.35
3600	526	0.84	593	1.00	652	1.17	708	1.33	759	1.50
3800	548	0.96	611	1.14	670	1.31	723	1.48	774	1.66
4000	569	1.10	631	1.29	687	1.47	739	1.65	789	1.83
4200	591	1.25	650	1.45	705	1.64	756	1.83	804	2.02
4400	613	1.42	670	1.63	723	1.83	773	2.03	820	2.23
4600	635	1.60	690	1.82	742	2.03	790	2.24	836	2.44
4800	657	1.80	710	2.02	761	2.24	808	2.46	853	2.68
5000	680	2.01	731	2.24	780	2.48	826	2.70	870	2.93

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	775	1.24	826	1.40	876	1.56	923	1.73	969	1.90
3200	785	1.37	835	1.53	883	1.70	929	1.88	974	2.06
3400	796	1.51	845	1.68	892	1.86	937	2.04	981	2.22
3600	809	1.67	856	1.84	901	2.03	945	2.21	988	2.40
3800	822	1.84	868	2.02	912	2.21	955	2.40	996	2.59
4000	835	2.02	880	2.21	923	2.40	965	2.60	1006	2.80
4200	850	2.21	893	2.41	936	2.61	976	2.81	1016	3.02
4400	865	2.43	907	2.63	949	2.84	988	3.05	1027	3.26
4600	880	2.65	922	2.86	962	3.08	1001	3.29	1039	3.51
4800	896	2.89	937	3.11	976	3.33	1014	3.56	—	—
5000	912	3.15	952	3.38	991	3.61	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Fan Performance — 50PG14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	542	0.93	607	1.10	665	1.27	719	1.44	770	1.62
3950	564	1.07	626	1.25	683	1.43	735	1.61	785	1.79
4150	586	1.22	645	1.41	701	1.60	752	1.78	800	1.97
4350	608	1.38	665	1.58	719	1.78	769	1.98	816	2.17
4550	630	1.55	685	1.77	737	1.98	786	2.18	832	2.39
4750	652	1.75	705	1.97	756	2.19	804	2.40	849	2.62
4950	674	1.95	726	2.19	775	2.42	822	2.64	866	2.86
5150	697	2.18	747	2.42	794	2.66	840	2.89	883	3.13
5350	719	2.42	767	2.67	814	2.92	858	3.16	901	3.41
5550	742	2.67	789	2.94	834	3.20	877	3.45	918	3.70
5750	765	2.95	810	3.22	854	3.49	896	3.76	936	4.02
5950	788	3.24	831	3.53	874	3.81	915	4.08	955	4.36
6150	811	3.56	853	3.85	894	4.14	935	4.43	973	4.71
6250	822	3.72	864	4.02	905	4.32	944	4.61	983	4.89

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	818	1.79	865	1.97	909	2.16	952	2.35	994	2.54
3950	832	1.97	877	2.16	920	2.35	963	2.55	1003	2.75
4150	846	2.16	890	2.36	932	2.56	974	2.76	1014	2.97
4350	861	2.37	904	2.57	945	2.78	985	2.99	1024	3.20
4550	876	2.59	918	2.80	959	3.02	998	3.23	1036	3.45
4750	892	2.83	933	3.05	973	3.27	1011	3.49	1049	3.72
4950	908	3.09	948	3.31	987	3.54	1025	3.77	1061	4.00
5150	924	3.36	964	3.59	1002	3.83	1039	4.06	1075	4.30
5350	941	3.65	980	3.89	1017	4.13	1054	4.38	1089	4.62
5550	958	3.96	996	4.21	1033	4.46	1069	4.71	1103	4.96
5750	975	4.28	1013	4.54	1049	4.80	1084	5.06	—	—
5950	993	4.63	1030	4.89	1065	5.16	—	—	—	—
6150	1011	4.99	—	—	—	—	—	—	—	—
6250	1020	5.18	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

1. Static pressure losses from accessories and options (Humidi-MiZer™ system, economizer, etc.) must be added to external static pressure before entering Fan Performance table. Refer to Accessory/FIOP Static Pressure information.
2. Interpolation is permissible. Do not extrapolate.
3. Fan performance tables are based on wet coils, clean filters, and casing losses. Gas heat losses are included for 48 series units.
4. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using the fan motors up to the bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
5. Use of a field-supplied motor may affect wire size. Recalculate the unit power supply MCA and MOCP if required. Contact your Carrier representative for details.
6. Use the following formula to calculate input watts:

   Input Watts = Bhp x (746/Motor Eff)

Fan Performance — 48PMD16 Vertical Supply / Return Units

CFM	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	513	0.79	A	585	0.99	A	656	1.23	A	730	1.53	A	807	1.91	A
4800	535	0.92	A	604	1.14	A	670	1.37	A	738	1.66	A	809	2.02	A
5100	558	1.07	A	624	1.30	A	687	1.54	A	749	1.82	A	814	2.15	A
5400	582	1.23	A	645	1.47	A	704	1.72	A	763	2.00	A	823	2.32	A
5700	605	1.42	A	666	1.67	A	723	1.93	A	779	2.21	A	835	2.52	A
6000	629	1.62	A	688	1.88	A	743	2.15	A	796	2.44	A	848	2.75	A
6300	653	1.83	A	710	2.12	A	763	2.40	A	814	2.69	A	864	3.00	A
6600	677	2.07	A	732	2.37	A	784	2.66	A	833	2.96	A	880	3.28	A
6900	701	2.33	A	755	2.64	A	805	2.95	A	852	3.26	A	898	3.58	A
7200	726	2.61	A	777	2.94	A	826	3.26	A	872	3.58	A	917	3.91	A
7500	750	2.92	A	800	3.25	A	848	3.59	A	893	3.92	A	936	4.26	B

CFM	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	880	2.33	A	942	2.75	A	993	3.12	A	1035	3.46	A	1072	3.77	A
4800	881	2.44	A	948	2.90	A	1005	3.34	A	1054	3.74	A	1095	4.11	A
5100	882	2.56	A	950	3.03	A	1012	3.51	A	1065	3.98	A	1112	4.41	B
5400	886	2.71	A	950	3.16	A	1013	3.66	A	1071	4.17	A	1123	4.67	B
5700	893	2.89	A	953	3.32	A	1014	3.81	A	1073	4.34	B	1128	4.88	B
6000	902	3.10	A	958	3.51	A	1016	3.98	A	1074	4.50	B	1130	5.06	B
6300	914	3.35	A	966	3.74	A	1020	4.18	A	1075	4.69	B	1130	5.24	B
6600	928	3.62	A	977	4.00	A	1027	4.43	B	1079	4.91	B	1132	5.44	B
6900	944	3.92	A	990	4.30	B	1037	4.71	B	1085	5.17	B	1135	5.68	B
7200	960	4.25	A	1004	4.63	B	1049	5.03	B	1094	5.47	B	1141	5.96	C
7500	978	4.61	B	1020	4.98	B	1062	5.38	B	1105	5.82	C	1149	6.29	C

Fan Performance — 48PME16 and 48PMF16 Vertical Supply / Return Units

CFM	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	527	0.82	A	599	1.03	A	670	1.28	A	745	1.60	A	822	1.99	A
4800	551	0.97	A	619	1.18	A	685	1.43	A	753	1.73	A	825	2.10	A
5100	575	1.12	A	639	1.35	A	701	1.60	A	764	1.89	A	830	2.25	A
5400	599	1.30	A	661	1.54	A	720	1.79	A	779	2.08	A	839	2.42	A
5700	623	1.49	A	683	1.74	A	739	2.00	A	795	2.29	A	851	2.62	A
6000	648	1.70	A	706	1.97	A	760	2.24	A	812	2.53	A	865	2.85	A
6300	673	1.93	A	729	2.21	A	781	2.49	A	831	2.79	A	881	3.11	A
6600	698	2.18	A	752	2.48	A	802	2.77	A	851	3.08	A	898	3.40	A
6900	723	2.46	A	775	2.77	A	824	3.07	A	871	3.39	A	917	3.72	A
7200	749	2.75	A	799	3.08	A	846	3.40	A	892	3.72	A	936	4.06	A
7500	774	3.08	A	823	3.41	A	869	3.74	A	913	4.08	A	956	4.42	B

CFM	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	893	2.42	A	953	2.82	A	1002	3.19	A	1043	3.52	A	1078	3.83	A
4800	896	2.54	A	961	3.00	A	1016	3.43	A	1063	3.82	A	1103	4.19	A
5100	899	2.67	A	965	3.14	A	1025	3.63	A	1077	4.09	A	1122	4.51	B
5400	903	2.82	A	967	3.29	A	1029	3.80	A	1086	4.31	B	1135	4.79	B
5700	910	3.01	A	971	3.45	A	1031	3.96	A	1090	4.50	B	1143	5.03	B
6000	920	3.22	A	976	3.65	A	1034	4.14	A	1092	4.68	B	1147	5.24	B
6300	932	3.47	A	985	3.88	A	1039	4.35	B	1094	4.87	B	1149	5.44	B
6600	946	3.76	A	996	4.15	A	1046	4.60	B	1099	5.10	B	1151	5.66	B
6900	962	4.07	A	1009	4.46	B	1056	4.89	B	1105	5.37	B	1155	5.90	C
7200	980	4.41	B	1024	4.80	B	1069	5.22	B	1114	5.68	B	1162	6.19	C
7500	998	4.78	B	1040	5.17	B	1082	5.58	B	1126	6.03	C	1170	6.53	C

LEGEND

BHP — Brake Horsepower (motor input to fan)

RPM — Revolutions Per Minute (fan speed)

Drive — Motor & Pulley Drive Option Based on 460V motor maximum BHP. See notes on this page.

See General Notes for Fan Performance Data Tables.

NOTES:

Grey Cells indicate field−supplied pulley change required.
Do not exceed listed motor maximum BHP value.

Motor Drive Ranges

(A) Low Range: 208/230 and 460V, RPM Range − 685 to 939, Maximum BHP − 4.26

(B) Mid−Low Range: All voltages, RPM Range − 949 to 1206, Maximum BHP − 5.75

(C) Mid−High Range: All voltages, RPM Range − 941 to 1176, Maximum BHP − 8.63

(D) High Range: Not used

Fan Performance — 48PMD20 Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
5400	582	1.23	A	645	1.47	A	704	1.72	A	763	2.00	A	823	2.32	A	886	2.71	A
5700	605	1.42	A	666	1.67	A	723	1.93	A	779	2.21	A	835	2.52	A	893	2.89	A
6000	629	1.62	A	688	1.88	A	743	2.15	A	796	2.44	A	848	2.75	A	902	3.10	A
6300	653	1.83	A	710	2.12	A	763	2.40	A	814	2.69	A	864	3.00	A	914	3.35	A
6600	677	2.07	A	732	2.37	A	784	2.66	A	833	2.96	A	880	3.28	A	928	3.62	A
6900	701	2.33	A	755	2.64	A	805	2.95	A	852	3.26	A	898	3.58	A	944	3.92	A
7200	726	2.61	A	777	2.94	A	826	3.26	A	872	3.58	A	917	3.91	A	960	4.25	A
7500	750	2.92	A	800	3.25	A	848	3.59	A	893	3.92	A	936	4.26	B	978	4.61	B
7800	775	3.24	A	824	3.60	A	870	3.94	A	913	4.29	B	955	4.64	B	996	5.00	B
8100	800	3.59	A	847	3.96	A	892	4.32	B	935	4.68	B	975	5.04	B	1015	5.41	B
8400	825	3.97	A	871	4.35	B	914	4.73	B	956	5.10	B	996	5.48	B	1035	5.85	C
8700	850	4.38	B	894	4.77	B	937	5.16	B	978	5.55	B	1017	5.93	C	1055	6.32	C
9000	875	4.81	B	918	5.21	B	960	5.62	B	1000	6.02	C	1038	6.42	C	1075	6.82	C

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
5400	950	3.16	A	1013	3.66	A	1071	4.17	A	1123	4.67	B	1167	5.14	B	1207	5.57	B
5700	953	3.32	A	1014	3.81	A	1073	4.34	B	1128	4.88	B	1177	5.41	B	1221	5.90	C
6000	958	3.51	A	1016	3.98	A	1074	4.50	B	1130	5.06	B	1182	5.63	B	1230	6.19	C
6300	966	3.74	A	1020	4.18	A	1075	4.69	B	1130	5.24	B	1184	5.83	C	1234	6.43	C
6600	977	4.00	A	1027	4.43	B	1079	4.91	B	1132	5.44	B	1184	6.03	C	1236	6.65	C
6900	990	4.30	B	1037	4.71	B	1085	5.17	B	1135	5.68	B	1185	6.25	C	1236	6.86	C
7200	1004	4.63	B	1049	5.03	B	1094	5.47	B	1141	5.96	C	1188	6.51	C	1237	7.10	C
7500	1020	4.98	B	1062	5.38	B	1105	5.82	C	1149	6.29	C	1194	6.81	C	1240	7.38	C
7800	1037	5.37	B	1077	5.77	C	1118	6.20	C	1160	6.66	C	1202	7.16	C	1245	7.70	C
8100	1054	5.79	C	1093	6.19	C	1132	6.61	C	1172	7.07	C	1212	7.55	C	1253	8.08	C
8400	1073	6.24	C	1110	6.64	C	1148	7.07	C	1186	7.51	C	1224	7.99	C	1263	8.50	C
8700	1092	6.72	C	1128	7.13	C	1164	7.55	C	1201	8.00	C	1237	8.47	C	1274	8.97	D
9000	1111	7.22	C	1146	7.64	C	1181	8.07	C	1216	8.51	C	1252	8.98	D	1287	9.48	D

LEGEND

Bhp – Brake Horsepower Input to Fan

Rpm – Fan speed

Drive – Drive option code based on 460V motor max BHP

Grey cells indicate field supplied pulley change required.

Fan Performance — 48PME20 and 48PMF20 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
5400	599	1.30	A	661	1.54	A	720	1.79	A	779	2.08	A	839	2.42	A	903	2.82	A
5700	623	1.49	A	683	1.74	A	739	2.00	A	795	2.29	A	851	2.62	A	910	3.01	A
6000	648	1.70	A	706	1.97	A	760	2.24	A	812	2.53	A	865	2.85	A	920	3.22	A
6300	673	1.93	A	729	2.21	A	781	2.49	A	831	2.79	A	881	3.11	A	932	3.47	A
6600	698	2.18	A	752	2.48	A	802	2.77	A	851	3.08	A	898	3.40	A	946	3.76	A
6900	723	2.46	A	775	2.77	A	824	3.07	A	871	3.39	A	917	3.72	A	962	4.07	A
7200	749	2.75	A	799	3.08	A	846	3.40	A	892	3.72	A	936	4.06	A	980	4.41	B
7500	774	3.08	A	823	3.41	A	869	3.74	A	913	4.08	A	956	4.42	B	998	4.78	B
7800	800	3.42	A	847	3.77	A	892	4.12	A	935	4.47	B	976	4.82	B	1017	5.19	B
8100	826	3.79	A	871	4.16	A	915	4.52	B	957	4.88	B	997	5.24	B	1036	5.62	B
8400	851	4.19	A	896	4.57	B	939	4.94	B	979	5.32	B	1018	5.69	B	1057	6.07	C
8700	877	4.62	B	921	5.01	B	962	5.40	B	1002	5.78	C	1040	6.17	C	1077	6.56	C
9000	904	5.07	B	946	5.48	B	986	5.88	C	1025	6.28	C	1062	6.68	C	1098	7.08	C

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
5400	967	3.29	A	1029	3.80	A	1086	4.31	B	1135	4.79	B	1178	5.25	B	1216	5.68	B
5700	971	3.45	A	1031	3.96	A	1090	4.50	B	1143	5.03	B	1191	5.55	B	1233	6.04	C
6000	976	3.65	A	1034	4.14	A	1092	4.68	B	1147	5.24	B	1198	5.81	C	1244	6.36	C
6300	985	3.88	A	1039	4.35	B	1094	4.87	B	1149	5.44	B	1202	6.04	C	1251	6.64	C
6600	996	4.15	A	1046	4.60	B	1099	5.10	B	1151	5.66	B	1204	6.26	C	1254	6.88	C
6900	1009	4.46	B	1056	4.89	B	1105	5.37	B	1155	5.90	C	1206	6.49	C	1256	7.12	C
7200	1024	4.80	B	1069	5.22	B	1114	5.68	B	1162	6.19	C	1210	6.76	C	1258	7.37	C
7500	1040	5.17	B	1082	5.58	B	1126	6.03	C	1170	6.53	C	1215	7.07	C	1262	7.66	C
7800	1057	5.57	B	1098	5.98	C	1139	6.42	C	1181	6.90	C	1224	7.43	C	1267	8.00	C
8100	1075	6.01	C	1114	6.42	C	1154	6.85	C	1193	7.32	C	1234	7.83	C	1275	8.38	C
8400	1094	6.47	C	1132	6.88	C	1170	7.32	C	1208	7.78	C	1246	8.28	C	1285	8.81	D
8700	1114	6.97	C	1150	7.38	C	1187	7.82	C	1223	8.28	C	1260	8.77	D	1297	9.29	D
9000	1134	7.50	C	1169	7.92	C	1204	8.36	C	1239	8.82	D	1275	9.30	D	1310	9.81	D

LEGEND

Bhp – Brake Horsepower Input to Fan

Rpm – Fan speed

Drive – Drive option code based on 460V motor max BHP

Grey cells indicate field supplied pulley change required.

Fan Performance — 48PMD24 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
6000	629	1.62	A	688	1.88	A	743	2.15	A	796	2.44	A	848	2.75	A	902	3.10	A
6400	661	1.91	A	717	2.20	A	770	2.48	A	820	2.78	A	869	3.09	A	919	3.43	A
6800	693	2.24	A	747	2.55	A	798	2.85	A	845	3.16	A	892	3.48	A	939	3.82	A
7200	726	2.61	A	777	2.94	A	826	3.26	A	872	3.58	A	917	3.91	A	960	4.25	A
7600	758	3.02	A	808	3.37	A	855	3.70	A	899	4.04	A	942	4.38	B	984	4.74	B
8000	792	3.48	A	839	3.84	A	884	4.19	A	927	4.55	B	969	4.91	B	1009	5.27	B
8400	825	3.97	A	871	4.35	B	914	4.73	B	956	5.10	B	996	5.48	B	1035	5.85	C
8800	858	4.52	B	902	4.91	B	945	5.31	B	985	5.70	B	1024	6.09	C	1061	6.48	C
9200	892	5.11	B	934	5.52	B	975	5.94	C	1014	6.35	C	1052	6.76	C	1088	7.17	C
9600	926	5.75	C	967	6.18	C	1006	6.62	C	1044	7.05	C	1081	7.48	C	1116	7.90	C
10000	960	6.45	C	999	6.90	C	1037	7.35	C	1074	7.80	C	1110	8.25	C	1144	8.69	D

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
6000	958	3.51	A	1016	3.98	A	1074	4.50	B	1130	5.06	B	1182	5.63	B	1230	6.19	C
6400	970	3.82	A	1022	4.26	A	1076	4.76	B	1131	5.31	B	1184	5.90	C	1235	6.50	C
6800	985	4.19	A	1033	4.61	B	1083	5.08	B	1134	5.60	B	1185	6.17	C	1236	6.79	C
7200	1004	4.63	B	1049	5.03	B	1094	5.47	B	1141	5.96	C	1188	6.51	C	1237	7.10	C
7600	1026	5.11	B	1067	5.51	B	1109	5.94	C	1152	6.41	C	1196	6.92	C	1241	7.48	C
8000	1048	5.65	B	1088	6.05	C	1128	6.47	C	1168	6.93	C	1208	7.42	C	1250	7.95	C
8400	1073	6.24	C	1110	6.64	C	1148	7.07	C	1186	7.51	C	1224	7.99	C	1263	8.50	C
8800	1098	6.88	C	1134	7.29	C	1170	7.72	C	1206	8.16	C	1242	8.63	D	1278	9.13	D
9200	1124	7.58	C	1159	8.00	C	1193	8.43	C	1228	8.88	D	1262	9.35	D	1296	9.84	D
9600	1151	8.33	C	1184	8.76	D	1218	9.20	D	1251	9.66	D	1284	10.13	D	1316	10.62	D
10000	1178	9.13	D	1211	9.58	D	1243	10.04	D	1275	10.50	D	1307	10.97	D	1338	11.46	–––

LEGEND
Bhp – Brake Horsepower Input to Fan
Rpm – Fan speed
Drive – Drive option code based on 460V motor max BHP
Grey cells indicate field–supplied pulley change required.

Fan Performance — 48PME24 and 48PMF24 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
6000	648	1.70	A	706	1.97	A	760	2.24	A	812	2.53	A	865	2.85	A	920	3.22	A
6400	681	2.01	A	736	2.30	A	788	2.58	A	837	2.88	A	887	3.21	A	937	3.56	A
6800	715	2.36	A	767	2.67	A	817	2.97	A	864	3.28	A	910	3.61	A	957	3.96	A
7200	749	2.75	A	799	3.08	A	846	3.40	A	892	3.72	A	936	4.06	A	980	4.41	B
7600	783	3.19	A	831	3.53	A	877	3.87	A	920	4.21	A	962	4.55	B	1004	4.92	B
8000	817	3.67	A	863	4.03	A	907	4.38	B	949	4.74	B	990	5.10	B	1030	5.47	B
8400	851	4.19	A	896	4.57	B	939	4.94	B	979	5.32	B	1018	5.69	B	1057	6.07	C
8800	886	4.77	B	929	5.16	B	970	5.56	B	1009	5.95	C	1047	6.34	C	1084	6.73	C
9200	921	5.39	B	962	5.81	C	1002	6.22	C	1040	6.63	C	1077	7.04	C	1113	7.45	C
9600	956	6.07	C	996	6.50	C	1034	6.94	C	1071	7.36	C	1107	7.79	C	1142	8.22	C
10000	991	6.81	C	1029	7.26	C	1067	7.71	C	1103	8.15	C	1137	8.60	C	1171	9.04	D

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
6000	976	3.65	A	1034	4.14	A	1092	4.68	B	1147	5.24	B	1198	5.81	C	1244	6.36	C
6400	988	3.97	A	1041	4.43	B	1095	4.95	B	1150	5.51	B	1202	6.11	C	1252	6.72	C
6800	1004	4.35	B	1053	4.79	B	1103	5.28	B	1154	5.82	C	1205	6.41	C	1255	7.04	C
7200	1024	4.80	B	1069	5.22	B	1114	5.68	B	1162	6.19	C	1210	6.76	C	1258	7.37	C
7600	1046	5.30	B	1087	5.71	B	1130	6.16	C	1173	6.65	C	1218	7.18	C	1263	7.77	C
8000	1069	5.86	C	1109	6.27	C	1149	6.71	C	1189	7.18	C	1230	7.69	C	1272	8.25	C
8400	1094	6.47	C	1132	6.88	C	1170	7.32	C	1208	7.78	C	1246	8.28	C	1285	8.81	D
8800	1121	7.14	C	1157	7.56	C	1192	8.00	C	1228	8.46	C	1265	8.94	D	1301	9.46	D
9200	1148	7.86	C	1182	8.29	C	1217	8.74	D	1251	9.20	D	1285	9.68	D	1320	10.19	D
9600	1176	8.65	D	1209	9.09	D	1242	9.54	D	1275	10.00	D	1308	10.49	D	1341	10.99	D
10000	1204	9.49	D	1236	9.94	D	1268	10.40	D	1300	10.87	D	1332	11.36	–––	–––	–––	–––

LEGEND
Bhp – Brake Horsepower Input to Fan
Rpm – Fan speed
Drive – Drive option code based on 460V motor max BHP
Grey cells indicate field–supplied pulley change required.

Fan Performance — 48PMD28 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
7500	719	2.59	A	770	2.93	A	817	3.26	A	861	3.59	A	903	3.93	B	944	4.28	B
8000	759	3.09	A	808	3.45	A	853	3.81	A	895	4.16	B	935	4.51	B	974	4.87	B
8500	799	3.65	A	846	4.03	A	889	4.41	B	930	4.79	B	969	5.16	B	1006	5.54	B
9000	840	4.28	A	884	4.68	B	926	5.09	B	966	5.48	B	1003	5.88	C	1039	6.28	C
9500	881	4.97	B	923	5.40	B	964	5.83	C	1002	6.25	C	1038	6.67	C	1073	7.09	C
10000	922	5.74	B	963	6.19	C	1001	6.64	C	1038	7.09	C	1074	7.53	C	1108	7.97	C
10500	963	6.59	C	1002	7.06	C	1040	7.54	C	1075	8.01	C	1110	8.47	C	1143	8.93	D
11000	1005	7.52	C	1042	8.01	C	1078	8.51	C	1113	9.01	D	1146	9.50	D	1178	9.98	D
11500	1046	8.53	C	1082	9.05	D	1117	9.57	D	1151	10.09	D	1183	10.60	D	1214	11.11	D
12000	1088	9.64	D	1123	10.18	D	1156	10.72	D	1189	11.26	---	---	---	---	---	---	---

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
7500	984	4.65	B	1025	5.05	B	1067	5.48	B	1109	5.95	C	1152	6.48	C	1197	7.06	C
8000	1013	5.25	B	1051	5.65	B	1089	6.07	C	1128	6.53	C	1167	7.02	C	1207	7.56	C
8500	1043	5.93	C	1079	6.33	C	1114	6.75	C	1150	7.20	C	1187	7.67	C	1224	8.18	C
9000	1074	6.68	C	1109	7.09	C	1142	7.52	C	1176	7.97	C	1210	8.43	C	1244	8.93	D
9500	1107	7.51	C	1140	7.93	C	1172	8.37	C	1204	8.82	D	1237	9.29	D	1269	9.78	D
10000	1140	8.41	C	1172	8.85	D	1203	9.31	D	1234	9.77	D	1265	10.24	D	1295	10.73	D
10500	1174	9.40	D	1205	9.86	D	1236	10.33	D	1265	10.80	D	1295	11.29	---	---	---	---
11000	1209	10.46	D	1239	10.95	D	1269	11.43	---	---	---	---	---	---	---	---	---	---
11500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

LEGEND

Bhp – Brake Horsepower Input to Fan

Rpm – Fan speed

Drive – Drive option code based on 460V motor max BHP

Grey cells indicate field–supplied pulley change required.

Fan Performance — 48PME28 and 48PMF28 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
7500	743	2.75	A	792	3.09	A	838	3.42	A	881	3.75	B	922	4.09	B	963	4.45	B
8000	785	3.28	A	832	3.64	A	875	3.99	B	916	4.34	B	956	4.70	B	995	5.07	B
8500	827	3.88	A	872	4.26	A	914	4.63	B	953	5.01	B	991	5.38	B	1028	5.77	C
9000	869	4.54	A	912	4.95	B	952	5.35	B	990	5.74	B	1027	6.14	C	1062	6.54	C
9500	912	5.28	B	953	5.71	B	991	6.13	C	1028	6.55	C	1063	6.97	C	1098	7.39	C
10000	954	6.10	C	994	6.55	C	1031	7.00	C	1067	7.44	C	1101	7.88	C	1134	8.32	C
10500	997	7.00	C	1035	7.47	C	1071	7.95	C	1105	8.41	C	1138	8.87	D	1170	9.34	D
11000	1040	7.99	C	1076	8.48	C	1111	8.98	D	1144	9.47	D	1177	9.96	D	1208	10.44	D
11500	1083	9.06	D	1118	9.59	D	1152	10.10	D	1184	10.62	D	1215	11.13	D	---	---	---
12000	1126	10.24	D	1160	10.78	D	1192	11.32	---	---	---	---	---	---	---	---	---	---

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
7500	1003	4.83	B	1045	5.24	B	1086	5.70	B	1129	6.19	C	1173	6.74	C	1218	7.35	C
8000	1033	5.46	B	1071	5.87	C	1109	6.31	C	1148	6.78	C	1188	7.30	C	1229	7.86	C
8500	1064	6.16	C	1100	6.58	C	1136	7.01	C	1172	7.47	C	1208	7.97	C	1246	8.50	C
9000	1097	6.95	C	1131	7.37	C	1165	7.81	C	1198	8.27	C	1233	8.75	D	1267	9.27	D
9500	1131	7.81	C	1163	8.25	C	1196	8.69	D	1228	9.16	D	1260	9.64	D	1292	10.15	D
10000	1166	8.76	D	1197	9.21	D	1228	9.67	D	1259	10.14	D	1289	10.63	D	1319	11.13	D
10500	1201	9.80	D	1232	10.26	D	1261	10.74	D	1291	11.22	---	---	---	---	---	---	---
11000	1238	10.92	D	1267	11.41	---	---	---	---	---	---	---	---	---	---	---	---	---
11500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

LEGEND

Bhp – Brake Horsepower Input to Fan

Rpm – Fan speed

Drive – Drive option code based on 460V motor max BHP

Grey cells indicate field–supplied pulley change required.

Fan Performance — 50PM16 Vertical Supply / Return Units

CFM	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	**467**	**0.67**	**A**	**544**	**0.87**	**A**	**615**	**1.09**	**A**	687	1.35	A	–	–	–
4800	**486**	**0.78**	**A**	**561**	**1.00**	**A**	**628**	**1.22**	**A**	694	1.47	A	763	1.78	A
5100	**506**	**0.91**	**A**	**578**	**1.13**	**A**	**642**	**1.36**	**A**	704	1.61	A	768	1.91	A
5400	**526**	**1.04**	**A**	**596**	**1.28**	**A**	**658**	**1.53**	**A**	717	1.78	A	776	2.06	A
5700	**547**	**1.19**	**A**	**614**	**1.45**	**A**	**674**	**1.70**	**A**	731	1.96	A	786	2.25	A
6000	**568**	**1.36**	**A**	**632**	**1.63**	**A**	691	1.90	A	746	2.17	A	798	2.45	A
6300	**589**	**1.54**	**A**	**651**	**1.82**	**A**	708	2.11	A	761	2.39	A	812	2.68	A
6600	**610**	**1.74**	**A**	**670**	**2.04**	**A**	726	2.33	A	777	2.63	A	827	2.92	A
6900	**632**	**1.96**	**A**	689	2.27	A	743	2.58	A	794	2.88	A	842	3.19	A
7200	**654**	**2.19**	**A**	709	2.51	A	762	2.84	A	811	3.16	A	858	3.48	A
7500	**676**	**2.45**	**A**	729	2.78	A	780	3.12	A	829	3.45	A	874	3.79	A

CFM	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5100	834	2.26	A	–	–	–	–	–	–	–	–	–	–	–	–
5400	836	2.40	A	900	2.80	A	–	–	–	–	–	–	–	–	–
5700	842	2.57	A	901	2.94	A	–	–	–	–	–	–	–	–	–
6000	851	2.76	A	905	3.12	A	**961**	**3.53**	**A**	–	–	–	–	–	–
6300	862	2.99	A	913	3.33	A	**965**	**3.72**	**A**	**1018**	**4.17**	**A**	–	–	–
6600	875	3.24	A	923	3.58	A	**971**	**3.95**	**A**	1021	4.37	B	1073	4.85	B
6900	888	3.51	A	934	3.85	A	**980**	**4.21**	**A**	1027	4.62	B	1075	5.07	B
7200	903	3.80	A	**947**	**4.15**	**A**	991	4.51	B	1035	4.90	B	1080	5.33	B
7500	918	4.12	A	961	4.47	B	1003	4.83	B	1045	5.22	B	1088	5.64	B

LEGEND

BHP – Brake Horsepower (motor input to fan)

RPM – Revolutions Per Minute (fan speed)

Drive – Motor & Pulley Drive Option Based on 460V motor maximum BHP. See notes on this page.

See General Notes for Fan Performance Data Tables.

NOTES:

Grey Cells indicate field−supplied pulley change required.
Do not exceed listed motor maximum BHP value.

Motor Drive Ranges

(A) Low Range:
208/230 and 460V – RPM Range – 685 to 939, Maximum BHP – 4.26
575V – RPM Range – 751 to 954 , Maximum BHP – 5.75

(B) Mid−Low Range: All voltages,
RPM Range – 949 to 1206, Maximum BHP – 5.75

(C) Mid−High Range: All voltages,
RPM Range – 941 to 1176, Maximum BHP – 8.63

(D) High Range: Not Used

Fan Performance — 50PM20 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
5400	526	1.04	A	596	1.28	A	658	1.53	A	717	1.78	A	776	2.06	A	836	2.40	A
5700	547	1.19	A	614	1.45	A	674	1.70	A	731	1.96	A	786	2.25	A	842	2.57	A
6000	568	1.36	A	632	1.63	A	691	1.90	A	746	2.17	A	798	2.45	A	851	2.76	A
6300	589	1.54	A	651	1.82	A	708	2.11	A	761	2.39	A	812	2.68	A	862	2.99	A
6600	610	1.74	A	670	2.04	A	726	2.33	A	777	2.63	A	827	2.92	A	875	3.24	A
6900	632	1.96	A	689	2.27	A	743	2.58	A	794	2.88	A	842	3.19	A	888	3.51	A
7200	654	2.19	A	709	2.51	A	762	2.84	A	811	3.16	A	858	3.48	A	903	3.80	A
7500	676	2.45	A	729	2.78	A	780	3.12	A	829	3.45	A	874	3.79	A	918	4.12	A
7800	698	2.72	A	749	3.06	A	799	3.42	A	846	3.77	A	891	4.11	A	934	4.46	B
8100	720	3.02	A	770	3.37	A	818	3.73	A	864	4.10	A	908	4.46	B	950	4.82	B
8400	743	3.33	A	791	3.70	A	837	4.07	A	883	4.45	B	926	4.83	B	967	5.20	B
8700	765	3.67	A	812	4.05	A	857	4.44	B	901	4.83	B	943	5.22	B	984	5.61	B
9000	788	4.03	A	833	4.42	B	877	4.82	B	920	5.23	B	961	5.63	B	1001	6.03	C

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
5400	900	2.80	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5700	901	2.94	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	905	3.12	A	961	3.53	A	—	—	—	—	—	—	—	—	—	—	—	—
6300	913	3.33	A	965	3.72	A	1018	4.17	A	—	—	—	—	—	—	—	—	—
6600	923	3.58	A	971	3.95	A	1021	4.37	B	1073	4.85	B	—	—	—	—	—	—
6900	934	3.85	A	980	4.21	A	1027	4.62	B	1075	5.07	B	1124	5.57	B	—	—	—
7200	947	4.15	A	991	4.51	B	1035	4.90	B	1080	5.33	B	1126	5.81	C	1174	6.33	C
7500	961	4.47	B	1003	4.83	B	1045	5.22	B	1088	5.64	B	1131	6.09	C	1176	6.59	C
7800	975	4.81	B	1016	5.18	B	1057	5.56	B	1097	5.98	C	1138	6.42	C	1180	6.90	C
8100	991	5.18	B	1030	5.56	B	1069	5.94	C	1108	6.35	C	1147	6.78	C	1187	7.25	C
8400	1007	5.58	B	1045	5.96	C	1083	6.35	C	1120	6.75	C	1158	7.18	C	1196	7.64	C
8700	1023	5.99	C	1060	6.38	C	1097	6.78	C	1134	7.19	C	1170	7.62	C	1206	8.07	C
9000	1039	6.43	C	1076	6.84	C	1112	7.24	C	1148	7.66	C	1183	8.09	C	1218	8.53	C

LEGEND

Bhp — Brake Horsepower Input to Fan

Rpm — Fan speed

Drive — Drive option code based on 460V motor max BHP

Grey cells indicate field−supplied pulley change required.

Fan Performance — 50PM24 — Vertical Supply/Return Units

	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
CFM	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
6000	568	1.36	A	632	1.63	A	691	1.90	A	746	2.17	A	798	2.45	A	851	2.76	A
6400	596	1.61	A	657	1.89	A	714	2.18	A	767	2.47	A	817	2.76	A	866	3.07	A
6800	625	1.88	A	683	2.19	A	737	2.49	A	789	2.80	A	837	3.10	A	884	3.42	A
7200	654	2.19	A	709	2.51	A	762	2.84	A	811	3.16	A	858	3.48	A	903	3.80	A
7600	683	2.54	A	736	2.87	A	786	3.21	A	835	3.55	A	880	3.89	A	923	4.23	A
8000	713	2.91	A	763	3.27	A	812	3.63	A	858	3.99	A	903	4.34	B	945	4.70	B
8400	743	3.33	A	791	3.70	A	837	4.07	A	883	4.45	B	926	4.83	B	967	5.20	B
8800	773	3.79	A	819	4.17	A	864	4.56	B	907	4.96	B	949	5.36	B	990	5.75	B
9200	803	4.28	B	847	4.68	B	890	5.09	B	933	5.51	B	973	5.92	C	1013	6.33	C
9600	833	4.82	B	876	5.24	B	917	5.66	B	958	6.10	C	998	6.53	C	1036	6.96	C
10000	864	5.41	B	905	5.84	C	945	6.28	C	984	6.73	C	1023	7.18	C	1060	7.63	C

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
6000	905	3.12	A	961	3.53	A	—	—	—	—	—	—	—	—	—	—	—	—
6400	916	3.41	A	967	3.80	A	1019	4.23	A	1073	4.72	B	—	—	—	—	—	—
6800	930	3.75	A	977	4.12	A	1025	4.53	B	1074	4.99	B	1124	5.50	B	—	—	—
7200	947	4.15	A	991	4.51	B	1035	4.90	B	1080	5.33	B	1126	5.81	C	1174	6.33	C
7600	966	4.58	B	1007	4.94	B	1049	5.33	B	1091	5.74	B	1133	6.20	C	1177	6.69	C
8000	986	5.06	B	1025	5.43	B	1065	5.81	C	1104	6.22	C	1144	6.66	C	1185	7.13	C
8400	1007	5.58	B	1045	5.96	C	1083	6.35	C	1120	6.75	C	1158	7.18	C	1196	7.64	C
8800	1028	6.14	C	1066	6.53	C	1102	6.93	C	1138	7.34	C	1174	7.77	C	1210	8.22	C
9200	1050	6.74	C	1087	7.15	C	1123	7.56	C	1157	7.98	C	1192	8.42	C	1226	8.86	D
9600	1073	7.39	C	1109	7.81	C	1144	8.24	C	1178	8.67	D	1211	9.11	D	1244	9.56	D
10000	1096	8.08	C	1131	8.52	C	1165	8.97	D	1198	9.41	D	1231	9.86	D	1263	10.32	D

LEGEND

Bhp — Brake Horsepower Input to Fan

Rpm — Fan speed

Drive — Drive option code based on 460V motor max BHP

Grey cells indicate field−supplied pulley change required.

Fan Performance — 50PM28 — Vertical Supply/Return Units

CFM	Available External Static Pressure (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
7500	640	2.12	A	697	2.45	A	750	2.79	A	798	3.13	A	843	3.46	A	886	3.79	B
8000	676	2.53	A	729	2.88	A	780	3.24	A	827	3.60	A	871	3.95	A	912	4.30	B
8500	711	2.99	A	762	3.36	A	810	3.74	A	856	4.12	A	899	4.50	B	939	4.87	B
9000	748	3.50	A	795	3.89	A	842	4.29	A	886	4.70	B	928	5.10	B	967	5.50	B
9500	784	4.08	A	829	4.48	A	874	4.90	B	916	5.33	B	957	5.76	C	996	6.18	C
10000	820	4.71	A	864	5.13	A	906	5.57	B	947	6.02	C	987	6.47	C	1025	6.92	C
10500	857	5.41	A	899	5.85	C	939	6.31	C	979	6.78	C	1017	7.25	C	1054	7.73	C
11000	894	6.18	C	934	6.63	C	973	7.11	C	1011	7.60	C	1048	8.10	C	1084	8.59	C
11500	931	7.02	C	969	7.49	C	1007	7.98	C	1043	8.49	C	1079	9.01	D	1114	9.53	D
12000	969	7.93	C	1005	8.42	C	1041	8.93	D	1076	9.46	D	1111	10.00	D	1145	10.54	D

CFM	Available External Static Pressure (in. wg)																	
	1.4			1.6			1.8			2.0			2.2			2.4		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
7500	927	4.13	B	968	4.49	B	1008	4.88	B	1050	5.30	B	1092	5.75	C	1134	6.26	C
8000	952	4.66	B	990	5.03	B	1028	5.41	B	1067	5.82	C	1105	6.26	C	1144	6.73	C
8500	978	5.25	B	1015	5.63	B	1051	6.02	C	1087	6.43	C	1123	6.85	C	1159	7.31	C
9000	1005	5.89	C	1041	6.29	C	1076	6.69	C	1110	7.11	C	1144	7.54	C	1178	7.98	C
9500	1032	6.60	C	1067	7.02	C	1101	7.44	C	1134	7.86	C	1167	8.30	C	1199	8.75	D
10000	1061	7.37	C	1095	7.81	C	1128	8.24	C	1160	8.69	D	1192	9.13	D	1223	9.59	D
10500	1089	8.19	C	1123	8.66	D	1155	9.12	D	1187	9.58	D	1218	10.04	D	1248	10.51	D
11000	1118	9.09	D	1152	9.58	D	1183	10.06	D	1214	10.54	D	1244	11.03	D	---	---	---
11500	1148	10.05	D	1181	10.56	D	1212	11.07	D	---	---	---	---	---	---	---	---	---
12000	1178	11.08	D	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

LEGEND
Bhp – Brake Horsepower Input to Fan
Rpm – Fan speed
Drive – Drive option code based on 460V motor max BHP
Grey cells indicate field–supplied pulley change required.

Fan Performance — 48PMD16 Horizontal Supply / Return Units

	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
CFM	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	**787**	**2.11**	**F**	**847**	**2.38**	**F**	904	2.65	F	957	2.92	F	1008	2.88	F
4800	**832**	**2.42**	**F**	**889**	**2.70**	**F**	943	2.98	F	994	3.26	F	1042	3.25	F
5100	**877**	**2.76**	**F**	931	3.05	F	982	3.33	F	1031	3.30	F	1078	3.66	F
5400	922	3.13	F	974	3.43	F	1023	3.38	F	1070	3.74	F	1115	4.12	F
5700	967	3.53	F	1017	3.47	F	1064	3.84	F	1109	4.22	F	1153	4.61	G
6000	1013	3.58	F	1060	3.96	F	**1105**	**4.35**	**G**	1149	4.75	G	1191	5.16	G
6300	1059	4.10	F	**1104**	**4.50**	**G**	1147	4.91	G	1189	5.32	G	1230	5.75	G
6600	**1105**	**4.67**	**G**	1148	5.09	G	1190	5.52	G	1230	5.95	H	1269	6.39	H
6900	1151	5.30	G	1192	5.73	G	1232	6.17	H	1272	6.62	H	1310	7.08	H
7200	1197	5.98	H	1237	6.43	H	1275	6.89	H	1313	7.36	H	**1350**	**7.83**	**H**
7500	1243	6.71	H	1281	7.18	H	1319	7.66	H	**1355**	**8.14**	**H**	**1391**	**8.63**	**H**

	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
CFM	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	1056	3.21	F	1103	3.56	F	1147	3.91	F	1191	4.28	G	1233	4.65	G
4800	1089	3.60	F	1134	3.96	F	1178	4.33	G	1220	4.71	G	1261	5.10	G
5100	1124	4.03	F	1167	4.41	G	1209	4.79	G	1250	5.18	G	1290	5.58	G
5400	1159	4.50	G	1201	4.89	G	1242	5.29	G	1282	5.70	G	1320	6.12	H
5700	1195	5.01	G	1236	5.42	G	1275	5.84	H	1314	6.26	H	**1352**	**6.69**	**H**
6000	1232	5.57	G	1271	6.00	H	1310	6.43	H	**1348**	**6.87**	**H**	**1384**	**7.31**	**H**
6300	1269	6.18	H	1308	6.62	H	**1345**	**7.07**	**H**	**1382**	**7.52**	**H**	————	———	———
6600	1308	6.84	H	**1345**	**7.29**	**H**	**1381**	**7.76**	**H**	————	———	———	————	———	———
6900	**1347**	**7.55**	**H**	**1383**	**8.02**	**H**	————	———	———	————	———	———	————	———	———
7200	**1386**	**8.31**	**H**	————	———	———	————	———	———	————	———	———	————	———	———
7500	————	———	———	————	———	———	————	———	———	————	———	———	————	———	———

Fan Performance — 48PME16 Horizontal Supply / Return Units

	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
CFM	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	**800**	**2.18**	**F**	**861**	**2.47**	F	918	2.75	F	972	3.04	F	1024	3.01	F
4800	**845**	**2.51**	**F**	903	2.80	F	958	3.10	F	1009	3.05	F	1059	3.41	F
5100	**891**	**2.86**	**F**	946	3.17	F	998	3.47	F	1048	3.47	F	1095	3.84	F
5400	937	3.24	F	989	3.56	F	1039	3.54	F	1087	3.93	F	1133	4.32	G
5700	983	3.66	F	1033	3.63	F	1081	4.03	F	1127	4.43	G	1171	4.84	G
6000	1029	3.74	F	1077	4.15	F	1123	4.56	G	1167	4.98	G	1210	5.41	G
6300	**1075**	**4.28**	**G**	1121	4.71	G	1165	5.14	G	1208	5.58	G	1249	6.03	H
6600	1122	4.88	G	1166	5.32	G	1208	5.78	H	1250	6.24	H	1290	6.70	H
6900	1169	5.52	G	1211	5.99	H	1252	6.46	H	1292	6.94	H	1330	7.43	H
7200	1215	6.23	H	1256	6.72	H	1296	7.21	H	1334	7.71	H	**1371**	**8.21**	**H**
7500	1262	7.00	H	1302	7.50	H	**1340**	**8.01**	**H**	**1377**	**8.53**	**H**	----	----	---

	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
CFM	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	1073	3.36	F	1120	3.71	F	1165	4.07	F	1209	4.43	G	1252	4.80	G
4800	1106	3.77	F	1152	4.14	F	1196	4.52	G	1239	4.90	G	1280	5.29	G
5100	1141	4.22	F	1186	4.61	G	1228	5.01	G	1270	5.41	G	1310	5.81	H
5400	1177	4.72	G	1220	5.13	G	1261	5.54	G	1302	5.95	H	**1341**	**6.38**	**H**
5700	1214	5.26	G	1255	5.68	G	1296	6.11	H	1335	6.55	H	**1373**	**6.99**	**H**
6000	1251	5.85	H	1292	6.29	H	1331	6.74	H	**1369**	**7.19**	**H**	----	----	---
6300	1290	6.49	H	1329	6.95	H	**1367**	**7.41**	**H**	----	----	---	----	----	---
6600	1328	7.18	H	**1366**	**7.65**	**H**	----	----	---	----	----	---	----	----	---
6900	**1368**	**7.92**	**H**	----	----	---	----	----	---	----	----	---	----	----	---
7200	----	----	---	----	----	---	----	----	---	----	----	---	----	----	---
7500	----	----	---	----	----	---	----	----	---	----	----	---	----	----	---

LEGEND

BHP — Brake Horsepower (motor input to fan)

RPM — Revolutions Per Minute (fan speed)

Drive — Motor & Pulley Drive Option Based on 460V motor maximum BHP. See notes on this page.

NOTES:

Grey Cells — Indicates field—supplied pulley change required. Do not exceed listed motor maximum BHP value.

Motor Drive Ranges

(E) Low Range: Not Used

(F) Mid—Low Range: 208/230 and 460V — RPM Range — 896 to 1227, Maximum BHP — 4.26

(G) Mid—High Range: All voltages, RPM Range — 1113 to 1414, Maximum BHP — 5.75

(H) High Range: All voltages, RPM Range — 1096 to 1339, Maximum BHP — 8.63

See General Notes for Fan Performance Data Tables.

Fan Performance — 48PMD20 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	**862**	**2.65**	917	2.93	969	3.21	1019	3.17	F 1066	3.52
5500	F 937	3.26	F 988	3.56	F 1036	3.53	F 1083	3.90	1127	4.28
6000	F 1013	3.58	1060	3.96	1105	4.35	G 1149	4.75	G 1191	5.16
6500	**1089**	**4.48**	G 1133	4.89	G **1175**	**5.31**	1216	5.73	1256	6.17
7000	G 1166	5.52	H 1207	5.96	H 1247	6.41	H 1285	6.86	H 1323	7.32
7500	H 1243	6.71	1282	7.18	1319	7.66	**1355**	**8.14**	**1391**	**8.63**
8000	H 1320	8.07	**1356**	**8.57**	**1392**	**9.08**	—	—	—	—
8500	**1398**	**9.60**	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	F 1112	3.88	F 1156	4.25	G 1199	4.63	G 1240	5.02	G 1280	5.42
5500	G 1171	4.67	G 1212	5.06	1253	5.47	H 1292	5.88	H 1331	6.30
6000	1232	5.57	H 1271	6.00	H 1310	6.43	**1348**	**6.87**	**1384**	**7.31**
6500	H 1295	6.61	1333	7.06	**1369**	**7.52**	—	—	—	—
7000	**1360**	**7.80**	**1396**	**8.27**	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
(E) Low Range: Not Used
(F) Mid-Low Range: 896 to 1227 rpm, 4.26 Bhp (208/230 and 460-v), 873 to 1108 rpm, 5.75 Bhp (575-v)
(G) Mid-High Range: 1113 to 1414 rpm, 5.75 Bhp
(H) High Range: 1096 to 1339 rpm, 8.63 Bhp

All other rpms require field−supplied drive.

2. See General Fan Performance Notes.

Fan Performance — 48PME20 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	**875**	**2.74**	931	3.04	984	3.34	1035	3.33	F 1083	3.69
5500	F 952	3.38	F 1003	3.32	F 1053	3.70	F 1100	4.09	1145	4.49
6000	1029	3.74	1077	4.15	1123	4.56	G 1167	4.98	G 1210	5.41
6500	**1106**	**4.67**	G 1151	5.11	G 1194	5.56	1236	6.01	H 1276	6.47
7000	G 1184	5.75	1226	6.23	H 1266	6.71	H 1306	7.19	**1344**	**7.68**
7500	H 1262	7.00	H 1302	7.50	**1340**	**8.01**	**1377**	**8.53**	—	—
8000	**1341**	**8.41**	**1378**	**8.95**	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	F 1130	4.07	G 1174	4.45	G 1218	4.84	G 1259	5.23	G 1300	5.63
5500	G 1189	4.90	1232	5.31	1273	5.72	H 1313	6.15	**1352**	**6.58**
6000	H 1251	5.85	H 1292	6.29	H 1331	6.74	**1369**	**7.19**	—	—
6500	1315	6.94	**1354**	**7.41**	**1391**	**7.89**	—	—	—	—
7000	**1381**	**8.18**	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—

LEGEND
Bhp — Brake Horsepower Input to Fan
Boldface indicates field−supplied drive required.

NOTES:
1. Motor drive ranges:
(E) Low Range: Not Used
(F) Mid-Low Range: 896 to 1227 rpm, 4.26 Bhp (208/230 and 460-v), 873 to 1108 rpm, 5.75 Bhp (575-v)
(G) Mid-High Range: 1113 to 1414 rpm, 5.75 Bhp
(H) High Range: 1096 to 1339 rpm, 8.63 Bhp

All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 48PMF20 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	**875**	**2.74**	931	3.04	984	3.34	1035	3.33	F 1083	3.69
5500	F 952	3.38	F 1003	3.32	F 1053	3.70	F 1100	4.09	1145	4.49
6000	1029	3.74	1077	4.15	1123	4.56	G 1167	4.98	G 1210	5.41
6500	**1106**	**4.67**	G 1151	5.11	G 1194	5.56	1236	6.01	H 1276	6.47
7000	G 1184	5.75	1226	6.23	H 1266	6.71	H 1306	7.19	**1344**	**7.68**
7500	H 1262	7.00	H 1302	7.50	**1340**	**8.01**	**1377**	**8.53**	—	—
8000	**1341**	**8.41**	**1378**	**8.95**	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	F 1130	4.07	G 1174	4.45	G 1218	4.84	G 1259	5.23	G 1300	5.63
5500	G 1189	4.90	1232	5.31	1273	5.72	H 1313	6.15	**1352**	**6.58**
6000	H 1251	5.85	H 1292	6.29	H 1331	6.74	**1369**	**7.19**	—	—
6500	1315	6.94	**1354**	**7.41**	**1391**	**7.89**	—	—	—	—
7000	**1381**	**8.18**	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—

LEGEND
Bhp — Brake Horsepower Input to Fan
Boldface indicates field−supplied drive required.

NOTES:
1. Motor drive ranges:
(E) Low Range: Not Used
(F) Mid-Low Range: 896 to 1227 rpm, 4.26 Bhp (208/230 and 460-v), 873 to 1108 rpm, 5.75 Bhp (575-v)
(G) Mid-High Range: 1113 to 1414 rpm, 5.75 Bhp
(H) High Range: 1096 to 1339 rpm, 8.63 Bhp

All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 48PMD24 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5500	F 937	3.26	F 988	3.56	F 1036	3.53	F 1083	3.90	G 1127	4.28
6000	F 1013	3.58	F 1060	3.96	**1105**	**4.35**	G 1149	4.75	G 1191	5.16
6500	**1089**	**4.48**	G 1133	4.89	G 1175	5.31	G 1216	5.73	H 1256	6.17
7000	G 1166	5.52	H 1207	5.96	H 1247	6.41	H 1285	6.86	H 1323	7.32
7500	H 1243	6.71	H 1282	7.18	H 1319	7.66	**1355**	**8.14**	**1391**	**8.63**
8000	H 1320	8.07	**1356**	**8.57**	**1392**	**9.08**	—	—	—	—
8500	**1398**	**9.60**	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—
9500	—	—	—	—	—	—	—	—	—	—
10000	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5500	G 1171	4.67	G 1212	5.06	G 1253	5.47	H 1292	5.88	H 1331	6.30
6000	G 1232	5.57	H 1271	6.00	H 1310	6.43	**1348**	**6.87**	**1384**	**7.31**
6500	H 1295	6.61	H 1333	7.06	**1369**	**7.52**	—	—	—	—
7000	**1360**	**7.80**	**1396**	**8.27**	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—
9500	—	—	—	—	—	—	—	—	—	—
10000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
(E) Low Range: Not Used
(F) Mid-Low Range: 896 to 1227 rpm, 4.26 Bhp (208/230 and 460-v), 873 to 1108 rpm, 5.75 Bhp (575-v)
(G) Mid-High Range: 1113 to 1414 rpm, 5.75 Bhp
(H) High Range: 1096 to 1339 rpm, 8.63 Bhp

All other rpms require field−supplied drive.

2. See General Fan Performance Notes.

Fan Performance — 48PME24 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5500	F 952	3.38	F 1003	3.32	F 1053	3.70	F 1100	4.09	G 1145	4.49
6000	F 1029	3.74	F 1077	4.15	G 1123	4.56	G 1167	4.98	G 1210	5.41
6500	**1106**	**4.67**	G 1151	5.11	G 1194	5.56	H 1236	6.01	H 1276	6.47
7000	G 1184	5.75	H 1226	6.23	H 1266	6.71	H 1306	7.19	**1344**	**7.68**
7500	H 1262	7.00	H 1302	7.50	**1340**	**8.01**	**1377**	**8.53**	—	—
8000	**1341**	**8.41**	**1378**	**8.95**	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—
9500	—	—	—	—	—	—	—	—	—	—
10000	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5500	G 1189	4.90	G 1232	5.31	G 1273	5.72	H 1313	6.15	**1352**	**6.58**
6000	H 1251	5.85	H 1292	6.29	H 1331	6.74	**1369**	**7.19**	—	—
6500	H 1315	6.94	**1354**	**7.41**	**1391**	**7.89**	—	—	—	—
7000	**1381**	**8.18**	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—
9500	—	—	—	—	—	—	—	—	—	—
10000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
(E) Low Range: Not Used
(F) Mid-Low Range: 896 to 1227 rpm, 4.26 Bhp (208/230 and 460-v), 873 to 1108 rpm, 5.75 Bhp (575-v)
(G) Mid-High Range: 1113 to 1414 rpm, 5.75 Bhp
(H) High Range: 1096 to 1339 rpm, 8.63 Bhp

All other rpms require field−supplied drive.

2. See General Fan Performance Notes.

Fan Performance — 48PMF24 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	0.2		0.4		0.6		0.8		1.0			
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp		
5500	F 952	3.38	F 1003	3.32	F 1053	3.70	F 1100	4.09	G 1145	4.49		
6000	F 1029	3.74	F 1077	4.15	G 1123	4.56	G 1167	4.98	G 1210	5.41		
6500	**1106**	**4.67**	G 1151	5.11	G 1194	5.56	H 1236	6.01	H 1276	6.47		
7000	G 1184	5.75	H 1226	6.23	H 1266	6.71	H 1306	7.19	**1344**	**7.68**		
7500	H 1262	7.00	H 1302	7.50	**1340**	**8.01**	**1377**	**8.53**	—	—		
8000	**1341**	**8.41**	**1378**	**8.95**	—	—	—	—	—	—		
8500	—	—	—	—	—	—	—	—	—	—		
9000	—	—	—	—	—	—	—	—	—	—		
9500	—	—	—	—	—	—	—	—	—	—		
10000	—	—	—	—	—	—	—	—	—	—		

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5500	G 1189	4.90	G 1232	5.31	G 1273	5.72	H 1313	6.15	**1352**	**6.58**
6000	H 1251	5.85	H 1292	6.29	H 1331	6.74	**1369**	**7.19**	—	—
6500	H 1315	6.94	**1354**	**7.41**	**1391**	**7.89**	—	—	—	—
7000	**1381**	**8.18**	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—
9500	—	—	—	—	—	—	—	—	—	—
10000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field—supplied drive required.

NOTES:

1. Motor drive ranges:
(E) Low Range: Not Used
(F) Mid-Low Range: 896 to 1227 rpm, 4.26 Bhp (208/230 and 460-v), 873 to 1108 rpm, 5.75 Bhp (575-v)
(G) Mid-High Range: 1113 to 1414 rpm, 5.75 Bhp
(H) High Range: 1096 to 1339 rpm, 8.63 Bhp

All other rpms require field—supplied drive.

2. See General Fan Performance Notes.

Fan Performance — 48PMD28 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6500	E 786	2.50	E 819	2.70	E 857	2.96	899	3.25	F 943	3.59
7000	842	3.09	871	3.30	905	3.55	F 943	3.85	983	4.19
7500	F 898	3.77	F 925	3.99	F 955	4.24	989	4.54	1026	4.88
8000	955	4.55	979	4.77	1007	5.03	1037	5.33	G 1070	5.67
8500	1012	5.42	1034	5.65	1059	5.92	G 1087	6.22	1117	6.56
9000	G 1069	6.41	G 1090	6.65	G 1113	6.92	1138	7.23	1165	7.57
9500	1127	7.51	1146	7.76	1167	8.04	1190	8.35	H 1215	8.69
10000	H 1184	8.74	H 1202	8.99	H 1221	9.28	H 1243	9.59	1266	9.93
10500	1242	10.09	1258	10.35	1276	10.64	1296	10.96	**1318**	**11.31**
11000	**1299**	**11.58**	**1315**	**11.85**	**1332**	**12.15**	**1350**	**12.47**	**1370**	**12.82**
11500	**1357**	**13.20**	**1372**	**13.48**	**1388**	**13.79**	—	—	—	—
12000	—	—	—	—	—	—	—	—	—	—
12500	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6500	F 988	3.97	1035	4.39	1082	4.87	G 1129	5.39	1177	5.95
7000	1024	4.57	G 1066	4.98	G 1109	5.43	1153	5.93	1197	6.48
7500	G 1063	5.25	1102	5.66	1141	6.11	1181	6.59	H 1221	7.11
8000	1105	6.04	1140	6.45	1176	6.89	H 1213	7.36	1250	7.87
8500	1149	6.94	1181	7.34	1215	7.78	1249	8.25	1283	8.74
9000	1194	7.94	H 1225	8.35	H 1256	8.79	1287	9.25	**1319**	**9.74**
9500	H 1242	9.07	1270	9.47	1298	9.91	**1328**	**10.37**	**1358**	**10.87**
10000	1290	10.31	**1316**	**10.72**	**1343**	**11.16**	**1370**	**11.62**	**1399**	**12.11**
10500	**1340**	**11.69**	**1364**	**12.10**	**1389**	**12.54**	—	—	—	—
11000	**1391**	**13.20**	—	—	—	—	—	—	—	—
11500	—	—	—	—	—	—	—	—	—	—
12000	—	—	—	—	—	—	—	—	—	—
12500	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
   (E) Low Range: 687−873 rpm, 5.75 Bhp
   (F) Mid-Low Range: 805 to 1007 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp

   All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 48PME28 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6500	E 799	2.58	E 883	2.79	E 872	3.05	914	3.36	F 958	3.71
7000	E 856	3.19	887	3.41	F 921	3.67	F 958	3.98	999	4.33
7500	F 913	3.89	F 941	4.12	972	4.39	1006	4.69	1042	5.04
8000	F 971	4.69	996	4.93	1024	5.20	1055	5.51	G 1088	5.86
8500	1029	5.60	1052	5.85	G 1078	6.12	G 1106	6.44	1136	6.78
9000	G 1087	6.62	G 1108	6.87	1132	7.16	1158	7.47	1185	7.82
9500	1145	7.75	1165	8.02	H 1187	8.31	H 1211	8.63	H 1236	8.99
10000	H 1203	9.01	H 1222	9.29	1243	9.59	1265	9.92	1288	10.28
10500	H 1261	10.40	1279	10.69	**1299**	**11.00**	**1319**	**11.34**	**1341**	**11.70**
11000	**1320**	**11.93**	**1337**	**12.23**	**1355**	**12.55**	**1374**	**12.89**	**1394**	**13.26**
11500	**1378**	**13.61**	—	—	—	—	—	—	—	—
12000	—	—	—	—	—	—	—	—	—	—
12500	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6500	F 1005	4.12	1052	4.57	1100	5.06	G 1148	5.60	1195	6.17
7000	1041	4.72	G 1084	5.16	G 1128	5.64	1172	6.17	H 1217	6.74
7500	G 1080	5.43	1119	5.86	1160	6.33	1201	6.84	1242	7.40
8000	G 1122	6.24	1158	6.66	1195	7.13	H 1233	7.63	1272	8.17
8500	1167	7.16	1200	7.58	H 1234	8.04	1269	8.53	**1304**	**9.06**
9000	H 1214	8.21	H 1244	8.62	1275	9.07	**1308**	**9.56**	**1340**	**10.08**
9500	H 1262	9.37	1290	9.78	**1319**	**10.23**	**1349**	**10.71**	**1379**	**11.23**
10000	**1312**	**10.66**	**1338**	**11.08**	**1365**	**11.52**	**1392**	**12.00**	—	—
10500	**1363**	**12.09**	**1387**	**12.51**	—	—	—	—	—	—
11000	—	—	—	—	—	—	—	—	—	—
11500	—	—	—	—	—	—	—	—	—	—
12000	—	—	—	—	—	—	—	—	—	—
12500	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
   (E) Low Range: 687−873 rpm, 5.75 Bhp
   (F) Mid-Low Range: 805 to 1007 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp

   All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 48PMF28 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6500	E 799	2.58	E 883	2.79	E 872	3.05	914	3.36	F 958	3.71
7000	E 856	3.19	887	3.41	F 921	3.67	F 958	3.98	999	4.33
7500	F 913	3.89	F 941	4.12	972	4.39	1006	4.69	1042	5.04
8000	F 971	4.69	996	4.93	1024	5.20	1055	5.51	G 1088	5.86
8500	1029	5.60	1052	5.85	G 1078	6.12	G 1106	6.44	1136	6.78
9000	G 1087	6.62	G 1108	6.87	1132	7.16	1158	7.47	1185	7.82
9500	1145	7.75	1165	8.02	H 1187	8.31	H 1211	8.63	H 1236	8.99
10000	H 1203	9.01	H 1222	9.29	1243	9.59	1265	9.92	1288	10.28
10500	H 1261	10.40	1279	10.69	**1299**	**11.00**	**1319**	**11.34**	**1341**	**11.70**
11000	**1320**	**11.93**	**1337**	**12.23**	**1355**	**12.55**	**1374**	**12.89**	**1394**	**13.26**
11500	**1378**	**13.61**	—	—	—	—	—	—	—	—
12000	—	—	—	—	—	—	—	—	—	—
12500	—	—	—	—	—	—	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6500	F 1005	4.12	1052	4.57	1100	5.06	G 1148	5.60	1195	6.17
7000	1041	4.72	G 1084	5.16	G 1128	5.64	1172	6.17	H 1217	6.74
7500	G 1080	5.43	1119	5.86	1160	6.33	1201	6.84	1242	7.40
8000	1122	6.24	1158	6.66	1195	7.13	H 1233	7.63	1272	8.17
8500	1167	7.16	1200	7.58	H 1234	8.04	1269	8.53	**1304**	**9.06**
9000	H 1214	8.21	H 1244	8.62	1275	9.07	**1308**	**9.56**	**1340**	**10.08**
9500	H 1262	9.37	1290	9.78	**1319**	**10.23**	**1349**	**10.71**	**1379**	**11.23**
10000	**1312**	**10.66**	**1338**	**11.08**	**1365**	**11.52**	**1392**	**12.00**	—	—
10500	**1363**	**12.09**	**1387**	**12.51**	—	—	—	—	—	—
11000	—	—	—	—	—	—	—	—	—	—
11500	—	—	—	—	—	—	—	—	—	—
12000	—	—	—	—	—	—	—	—	—	—
12500	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
   (E) Low Range: 687−873 rpm, 5.75 Bhp
   (F) Mid-Low Range: 805 to 1007 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp

   All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 50PM16 Horizontal Supply / Return Units

CFM	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	**533**	**1.09**	**E**	**603**	**1.31**	**E**	**664**	**1.53**	**E**	724	1.76	E	784	2.01	E
4800	**558**	**1.25**	**E**	**626**	**1.48**	**E**	685	1.71	E	742	1.95	E	798	2.20	E
5100	**584**	**1.43**	**E**	**650**	**1.68**	**E**	707	1.91	E	761	2.15	E	813	2.40	E
5400	**610**	**1.63**	**E**	**674**	**1.88**	**E**	729	2.13	E	781	2.38	E	831	2.63	E
5700	**636**	**1.85**	**E**	698	2.11	E	753	2.36	E	802	2.62	E	850	2.88	E
6000	**663**	**2.09**	**E**	723	2.35	E	776	2.62	E	825	2.88	E	871	3.14	E
6300	690	2.35	E	748	2.62	E	800	2.89	E	847	3.16	E	892	3.43	E
6600	717	2.62	E	773	2.90	E	824	3.18	E	870	3.46	E	914	3.73	E
6900	744	2.92	E	799	3.20	E	849	3.49	E	894	3.77	E	936	4.06	E
7200	772	3.24	E	825	3.52	E	873	3.82	E	918	4.11	E	959	4.40	F
7500	800	3.58	E	850	3.86	E	898	4.16	E	942	4.47	F	982	4.77	F

CFM	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive	RPM	BHP	Drive
4500	845	2.29	E	907	2.59	E	970	2.93	E	–	–	–	–	–	–
4800	854	2.47	E	912	2.76	E	970	3.08	E	1028	3.42	E	–	–	–
5100	866	2.67	E	920	2.96	E	974	3.26	E	1029	3.60	E	1084	3.95	E
5400	881	2.89	E	931	3.18	E	981	3.48	E	1033	3.80	E	1085	4.14	E
5700	898	3.14	E	945	3.42	E	992	3.72	E	1040	4.03	E	1089	4.36	F
6000	916	3.41	E	960	3.69	E	1005	3.98	E	1050	4.29	F	1096	4.61	F
6300	935	3.70	E	978	3.98	E	1021	4.27	F	1063	4.57	F	1106	4.89	F
6600	956	4.01	E	997	4.29	F	1037	4.59	F	1078	4.89	F	1119	5.20	F
6900	977	4.34	F	1017	4.63	F	1056	4.92	F	1095	5.23	F	1133	5.54	F
7200	999	4.69	F	1037	4.99	F	1075	5.28	F	1112	5.59	F	1150	5.90	G
7500	1021	5.07	F	1059	5.37	F	1095	5.67	F	1131	5.98	G	1167	6.29	G

LEGEND

BHP — Brake Horsepower (motor input to fan)

RPM — Revolutions Per Minute (fan speed)

Drive — Motor & Pulley Drive Option Based on 460V motor maximum BHP. See notes on this page.

NOTES:

Grey Cells — Indicates field−supplied pulley change required.
Do not exceed listed motor maximum BHP value.

Motor Drive Ranges

(E) Low Range:
208/230 and 460V — RPM Range — 685 to 939, Maximum BHP — 4.26
575V — RPM Range — 751 to 954, Maximum BHP — 5.75

(F) Mid−Low Range:
All voltages, RPM Range — 949 to 1206, Maximum BHP — 5.75

(G) Mid−High Range:
All voltages, RPM Range — 941 to 1176, Maximum BHP — 8.63

(H) High Range: Not Used

See General Notes for Fan Performance Data Tables.

Fan Performance — 50PM20 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	**575**	**1.37**	**642**	**1.61**	700	1.84	754	2.08	808	2.33
5500	**619**	**1.71**	**682**	**1.96**	737	2.21	788	2.45	837	2.71
6000	**663**	**2.09**	723	2.35	**E** 776	2.62	**E** 825	2.88	**E** 871	3.14
6500	708	2.53	765	2.80	816	3.08	863	3.35	906	3.63
7000	**E** 753	3.02	**E** 807	3.30	857	3.59	902	3.88	**944**	**4.17**
7500	800	3.58	850	3.86	898	4.16	**942**	**4.47**	982	4.77
8000	847	4.20	**894**	**4.48**	**940**	**4.80**	**F** 982	5.11	**F** 1022	5.43
8500	**894**	**4.88**	**939**	**5.17**	**F** 982	5.49	1024	5.82	1062	6.14
9000	**G** 941	5.63	**G** 983	5.92	**G** 1025	6.24	**G** 1065	6.58	**G** 1103	6.92

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	862	2.60	917	2.89	972	3.20	1028	3.53	1084	3.89
5500	**E** 886	2.97	**E** 935	3.25	985	3.55	1035	3.87	1086	4.21
6000	916	3.41	960	3.69	**F** 1005	3.98	**F** 1050	4.29	**F** 1096	4.61
6500	949	3.90	990	4.19	1032	4.48	1073	4.78	1114	5.10
7000	**F** 984	4.46	**F** 1023	4.75	1062	5.04	1100	5.34	1139	5.66
7500	1021	5.07	1059	5.37	1095	5.67	**G** 1131	5.98	**G** 1167	6.29
8000	1059	5.74	1095	6.05	**G** 1130	6.36	1165	6.67	1199	6.99
8500	1099	6.47	**G** 1133	6.79	1167	7.11	1200	7.43	**H** 1232	7.76
9000	**G** 1138	7.26	1172	7.59	**H** 1205	7.93	**H** 1237	8.26	1268	8.59

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
(E) Low Range: 685−939 rpm, 4.26 Bhp (208/230 and 460−v), 751−954, 575 Bhp (575−v)
(F) Mid-Low Range: 949 to 1206 rpm, 5.75 Bhp
(G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
(H) High Range: 1014 to 1297 rpm, 11.50 Bhp
All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 50PM24 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	0.2		0.4		0.6		0.8		1.0			
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp		
5500	**619**	**1.71**	**682**	**1.96**	737	2.21	788	2.45	837	2.71		
6000	**663**	**2.09**	723	2.35	776	2.62	825	2.88	871	3.14	**E**	
6500	708	2.53	**E** 765	2.80	**E** 816	3.08	**E** 863	3.35	906	3.63		
7000	**E** 753	3.02	807	3.30	857	3.59	902	3.88	**944**	**4.17**		
7500	800	3.58	850	3.86	898	4.16	**942**	**4.47**	982	4.77		
8000	847	4.20	**894**	**4.48**	**940**	**4.80**	**F** 982	5.11	**F** 1022	5.43		
8500	**894**	**4.88**	**939**	**5.17**	**F** 982	5.49	1024	5.82	1062	6.14		
9000	941	5.63	983	5.92	1025	6.24	1065	6.58	**G** 1103	6.92		
9500	**G** 989	6.45	**G** 1029	6.74	**G** 1069	7.07	**G** 1108	7.41	1144	7.77		
10000	1037	7.34	1075	7.63	1113	7.96	1150	8.32	**H** 1186	8.68		

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	1.2		1.4		1.6		1.8		2.0			
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp		
5500	886	2.97	**E** 935	3.25	985	3.55	1035	3.87	1086	4.21		
6000	**E** 916	3.41	960	3.69	1005	3.98	1050	4.29	1096	4.61		
6500	949	3.90	990	4.19	**F** 1032	4.48	**F** 1073	4.78	**F** 1114	5.10		
7000	984	4.46	**F** 1023	4.75	1062	5.04	1100	5.34	1139	5.66		
7500	**F** 1021	5.07	1059	5.37	1095	5.67	1131	5.98	**G** 1167	6.29		
8000	1059	5.74	1095	6.05	1130	6.36	**G** 1165	6.67	1199	6.99		
8500	1099	6.47	**G** 1133	6.79	**G** 1167	7.11	1200	7.43	**H** 1232	7.76		
9000	**G** 1138	7.26	1172	7.59	1205	7.93	**H** 1237	8.26	1268	8.59		
9500	1179	8.12	1212	8.46	**H** 1244	8.81	1275	9.15	**1305**	**9.50**		
10000	**H** 1220	9.04	**H** 1252	9.40	1283	9.76	**1313**	**10.11**	**1342**	**10.47**		

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
   (E) Low Range: 685−939 rpm, 4.26 Bhp (208/230 and 460−v), 751−954, 575 Bhp (575−v)
   (F) Mid-Low Range: 949 to 1206 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

Fan Performance — 50PM28 — Horizontal Supply/Return Units

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	0.2		0.4		0.6		0.8		1.0			
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp		
6500	759	2.89	804	3.17	E 844	3.42	883	3.68	922	3.96		
7000	E 810	3.47	E 853	3.77	891	4.04	F 928	4.30	F 964	4.58		
7500	862	4.12	903	4.43	F 939	4.72	974	5.00	1008	5.29		
8000	F 913	4.84	F 953	5.18	988	5.48	1021	5.77	1053	6.07		
8500	965	5.63	1003	5.99	1037	6.32	G 1069	6.62	G 1100	6.93		
9000	1017	6.50	1054	6.89	G 1087	7.23	1118	7.55	1147	7.87		
9500	G 1069	7.45	G 1105	7.86	1137	8.22	1167	8.56	1195	8.89		
10000	1121	8.48	1156	8.92	1187	9.30	1216	9.66	H 1243	10.01		
10500	1173	9.60	H 1207	10.06	H 1238	10.47	H 1266	10.85	1292	11.21		
11000	H 1226	10.81	1259	11.30	**1288**	**11.72**	**1316**	**12.12**	**1342**	**12.50**		
11500	**1278**	**12.11**	**1310**	**12.62**	**1339**	**13.07**	**1366**	**13.49**	—	—		
12000	**1331**	**13.51**	—	—	—	—	—	—	—	—		
12500	—	—	—	—	—	—	—	—	—	—		

Airflow (Cfm)	Available External Static Pressure (in. wg)											
	1.2		1.4		1.6		1.8		2.0			
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp		
6500	962	4.27	F 1003	4.61	1045	4.98	1090	5.41	1135	5.87		
7000	F 1000	4.88	1037	5.21	G 1075	5.56	G 1115	5.95	G 1155	6.38		
7500	1041	5.58	G 1075	5.90	1110	6.24	1145	6.61	1182	7.01		
8000	G 1085	6.37	1116	6.68	1148	7.01	1180	7.36	1214	7.74		
8500	1129	7.23	1159	7.55	1189	7.88	H 1219	8.22	H 1249	8.59		
9000	1175	8.18	1204	8.50	H 1232	8.83	1260	9.18	1288	9.53		
9500	1222	9.22	H 1249	9.55	1276	9.88	**1302**	**10.22**	**1329**	**10.58**		
10000	H 1270	10.34	1296	10.68	**1321**	**11.02**	**1346**	**11.37**	**1371**	**11.72**		
10500	**1318**	**11.56**	**1343**	**11.90**	**1367**	**12.25**	**1391**	**12.61**	—	—		
11000	**1366**	**12.86**	**1390**	**13.22**	—	—	—	—	—	—		
11500	—	—	—	—	—	—	—	—	—	—		
12000	—	—	—	—	—	—	—	—	—	—		
12500	—	—	—	—	—	—	—	—	—	—		

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field−supplied drive required.

NOTES:

1. Motor drive ranges:
   (E) Low Range: 687−873, 5.75 Bhp
   (F) Mid-Low Range: 805 to 1007 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field−supplied drive.
2. See General Fan Performance Notes.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

1. Static pressure losses from accessories and options (Humidi-MiZer™ system, economizer, etc.) must be added to external static pressure before entering Fan Performance table. Refer to Accessory/FIOP Static Pressure information.
2. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using the fan motors up to the bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator−Fan Motor Specifications for additional information.
3. Use of a field-supplied motor may affect wire size. Contact your Carrier representative for details.
4. Interpolation is permissible. Do not extrapolate.

APPENDIX D — ADDITIONAL START–UP DATA

Air Quantity Limits (50PG03–14 Units)

UNIT 50PG	COOLING (cfm)		HEATING (cfm) OPTIONAL ELECTRIC HEAT	
	Min	Max	Min	Max
03	600	1000	600	1000
04	900	1500	900	1500
05	1200	2000	1200	2000
06	1500	2500	1500	2500
07	1800	3000	1800	3000
08	2250	3750	2250	3750
09	2550	4250	2550	4250
12	3000	5000	3000	5000
14	3750	6250	3750	6250

Air Quantity Limits (48PG03–14 Units)

UNIT 48PG	COOLING (cfm)		HEATING (cfm)	
	Min	Max	Min	Max
03	600	1000	600	1680
04 (Low Heat)	900	1500	600	1680
04 (Med Heat)	900	1500	940	2810
04 (High Heat)	900	1500	1130	2820
05 (Low Heat)	1200	2000	600	1680
05 (Med Heat)	1200	2000	940	2810
05 (High Heat)	1200	2000	1130	2820
06 (Low Heat)	1500	2500	940	2810
06 (Med Heat)	1500	2500	1130	2820
06 (High Heat)	1500	2500	1510	2520
07 (Low Heat)	1800	3000	940	2810
07 (Med Heat)	1800	3000	1130	2820
07 (High Heat)	1800	3000	1510	2520
08 (Low Heat)	2250	3750	2060	5160
08 (Med Heat)	2250	3750	2110	6870
08 (High Heat)	2250	3750	2450	4900
09 (Low Heat)	2550	4250	2060	5160
09 (Med Heat)	2550	4250	2110	6870
09 (High Heat)	2550	4250	2450	4900
12 (Low Heat)	3000	5000	2110	6870
12 (Med Heat)	3000	5000	2450	4900
12 (High Heat)	3000	5000	3150	6300
14 (Low Heat)	3750	6250	2110	6870
14 (Med Heat)	3750	6250	2450	4900
14 (High Heat)	3750	6250	3150	6300

Air Quantity Limits (48PM16–28 Units)

48PM	COOLING		GAS HEAT	HEATING (NAT. GAS, VERTICAL)	HEATING (NAT. GAS, HORIZONTAL)	HEATING (PROPANE, VERTICAL)	HEATING (PROPANE, HORIZONTAL)
	Minimum Cfm	Maximum Cfm		Minimum Cfm	Minimum Cfm	Minimum Cfm	Minimum Cfm
16	4500	7500	High Heat (8 Cell)	5522	5522	5522	4920
			Medium Heat (8 Cell)	4977	4977	4480	4480
			Low Heat (5 Cell)	4218	4218	4218	3796
20	5400	9,000	High Heat (8 Cell)	5522	5522	5522	4920
			Medium Heat (8 Cell)	4977	4977	4480	4480
			Low Heat (5 Cell)	4218	4218	4218	3796
24	6000	10,000	High Heat (8 Cell)	5522	5522	5522	4920
			Medium Heat (8 Cell)	4977	4977	4480	4480
			Low Heat (5 Cell)	4218	4218	4218	3796
28	7500	12,000	High Heat (8 Cell)	5522	5470*	5522	4920*
			Medium Heat (8 Cell)	4977	4977*	4480	4480*
			Low Heat (5 Cell)	4218	4218	4218	3796

*7000 cfm minimum recommended above 1.0—in. wg external static pressure.

Air Quantity Limits (50PM16–28 Units)

50PM	COOLING		ELECTRIC HEAT	ELECTRIC HEAT (Vertical)	ELECTRIC HEAT (Horizontal)
	Minimum Cfm	Maximum Cfm		Minimum Cfm	Minimum Cfm
16	4500	7500	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
20	5400	9,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
24	6000	10,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
28	7500	12,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750

Evaporator Fan Motor Specifications – 48/50PG

48/50PG	DRIVE	VOLTAGE/PHASE	EFFICIENCY	MAX BHP	MAX AMPS
03	Low	208/1ph	0.73	0.85	4.0
		230/1ph	0.73	0.85	4.0
	High	208/1ph	0.73	0.85	4.0
		230/1ph	0.73	0.85	4.0
04	Low	208/1ph	0.73	0.85	4.0
		230/1ph	0.73	0.85	4.0
		208/3ph	0.73	0.85	4.0
		230/3ph	0.73	0.85	4.0
		460/3ph	0.73	0.85	2.0
		575/3ph	0.73	0.85	1.6
	High	208/1ph	0.73	0.85	4.0
		230/1ph	0.73	0.85	4.0
		208/3ph	0.73	0.85	4.0
		230/3ph	0.73	0.85	4.0
		460/3ph	0.73	0.85	2.0
		575/3ph	0.73	0.85	1.6
05	Low	208/1ph	0.73	0.85	4.0
		230/1ph	0.73	0.85	4.0
		208/3ph	0.73	0.85	4.0
		230/3ph	0.73	0.85	4.0
		460/3ph	0.73	0.85	2.0
		575/3ph	0.73	0.85	1.6
	High	208/1ph	0.78	1.6	8.3
		230/1ph	0.78	1.6	8.3
		208/3ph	0.80	2.4	6.4
		230/3ph	0.80	2.4	6.4
		460/3ph	0.80	2.4	3.2
		575/3ph	0.80	2.4	2.4
06	Low	208/1ph	0.73	0.85	4.0
		230/1ph	0.73	0.85	4.0
		208/3ph	0.80	2.4	6.4
		230/3ph	0.80	2.4	6.4
		460/3ph	0.80	2.4	3.2
		575/3ph	0.80	2.4	2.4
	High	208/1ph	0.78	1.6	8.3
		230/1ph	0.78	1.6	8.3
		208/3ph	0.80	2.4	6.4
		230/3ph	0.80	2.4	6.4
		460/3ph	0.80	2.4	3.2
		575/3ph	0.80	2.4	2.4
07	Low	208/3ph	0.80	2.4	6.4
		230/3ph	0.80	2.4	6.4
		460/3ph	0.80	2.4	3.2
		575/3ph	0.80	2.4	2.4
	High	208/3ph	0.84	3.1	8.8
		230/3ph	0.84	3.1	8.8
		460/3ph	0.84	3.1	4.4
		575/3ph	0.82	3.7	4.2
08	Low	208/3ph	0.80	2.4	6.4
		230/3ph	0.80	2.4	6.4
		460/3ph	0.80	2.4	3.2
		575/3ph	0.80	2.4	2.4
	High	208/3ph	0.84	3.1	8.8
		230/3ph	0.84	3.1	8.8
		460/3ph	0.84	3.1	4.4
		575/3ph	0.82	3.7	4.2
09	Low	208/3ph	0.80	2.4	6.4
		230/3ph	0.80	2.4	6.4
		460/3ph	0.80	2.4	3.2
		575/3ph	0.80	2.4	2.4
	High	208/3ph	0.83	3.7	11.0
		230/3ph	0.83	3.7	11.0
		460/3ph	0.83	3.7	5.5
		575/3ph	0.82	3.7	4.2

NOTES:

1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

3. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor-fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT-compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements. Therefore, the indoor-fan motors for Carrier 48/50PG03-14 units are exempt from these requirements.

Evaporator Fan Motor Specifications – 48/50PG (cont)

48/50PG	DRIVE	VOLTAGE/PHASE	EFFICIENCY	MAX BHP	MAX AMPS
12	Low	208/3ph	0.84	3.1	8.8
		230/3ph	0.84	3.1	8.8
		460/3ph	0.84	3.1	4.4
		575/3ph	0.82	3.7	4.2
	High	208/3ph	0.83	3.7	11.0
		230/3ph	0.83	3.7	11.0
		460/3ph	0.83	3.7	5.5
		575/3ph	0.82	3.7	4.2
14	Low	208/3ph	0.83	3.7	11.0
		230/3ph	0.83	3.7	11.0
		460/3ph	0.83	3.7	5.5
		575/3ph	0.82	3.7	4.2
	High	208/3ph	0.81	5.25	14.8
		230/3ph	0.81	5.25	14.8
		460/3ph	0.81	5.25	7.4
		575/3ph	0.81	5.25	5.9

NOTES:

1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

3. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor-fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT-compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements. Therefore, the indoor-fan motors for Carrier 48/50PG03-14 units are exempt from these requirements.

Evaporator Fan Motor Specifications – 48PM16–28

UNIT 48PM	DRIVE	ORIENTATION	VOLTAGE	EFFICIENCY %	MAX BHP	MAX AMPS
16	Low	Vertical	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid−Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
	Low	Horizontal	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
	Mid−Low	Horizontal	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid−High	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
20	Low	Vertical	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid−Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
	Low	Horizontal	208	N/A	N/A	N/A
			230	N/A	N/A	N/A
			460	N/A	N/A	N/A
			575	N/A	N/A	N/A
	Mid−Low	Horizontal	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid−High	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4

See Notes on next page

Evaporator Fan Motor Specifications – 48PM16–28 (cont)

UNIT 48PM	DRIVE	ORIENTATION	VOLTAGE	EFFICIENCY %	MAX BHP	MAX AMPS
24	Low	Vertical	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid−Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
	Low	Horizontal	208	N/A	N/A	N/A
			230	N/A	N/A	N/A
			460	N/A	N/A	N/A
			575	N/A	N/A	N/A
	Mid−Low	Horizontal	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid−High	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
28	Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
	Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid−High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Horizontal	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0

NOTES:

1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. All Indoor−fan motors 5 hp and larger meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT) effective October 24, 1997.

Evaporator Fan Motor Specifications – 50PM16–28

UNIT 50PM	DRIVE	ORIENTATION	VOLTAGE	EFFICIENCY (%)	MAX BHP	MAX AMPS
16	Low	Vertical	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid-Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
	Low	Horizontal	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid-Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Horizontal	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
20	Low	Vertical	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid-Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
	Low	Horizontal	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid-Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Horizontal	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0

See Notes next page

Evaporator Fan Motor Specifications – 50PM16–28 (cont)

UNIT 50PM	DRIVE	ORIENTATION	VOLTAGE	EFFICIENCY (%)	MAX BHP	MAX AMPS
24	Low	Vertical	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid-Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
	Low	Horizontal	208	85.8	4.26	10.6
			230	85.8	4.26	9.6
			460	85.8	4.26	4.8
			575	87.5	5.75	6.0
	Mid-Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Horizontal	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
28	Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-Low	Vertical	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Vertical	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Vertical	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0
	Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-Low	Horizontal	208	87.5	5.37	15.8
			230	87.5	5.75	15.4
			460	87.5	5.75	7.7
			575	87.5	5.75	6.0
	Mid-High	Horizontal	208	88.5	7.66	22.0
			230	88.5	8.51	22.0
			460	88.5	8.63	11.6
			575	88.5	8.63	9.4
	High	Horizontal	208	89.5	9.94	28.0
			230	89.5	10.45	28.0
			460	89.5	11.19	15.0
			575	89.5	11.50	12.0

NOTES:

1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

Fan Rpm at Motor Pulley Settings* – 48/50PG

UNIT 48/50PG	DRIVE	MOTOR PULLEY TURNS OPEN										
		0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
03	Low	736	710	685	660	634	609	583	558	533	507	482
	High	1001	966	932	897	863	828	794	759	725	690	656
04	Low	736	710	685	660	634	609	583	558	533	507	482
	High	1128	1095	1062	1028	995	962	929	896	863	829	796
05	Low	910	878	847	815	784	753	721	690	659	627	596
	High	1173	1139	1104	1070	1035	1001	966	932	897	863	828
06	Low	978	949	920	891	863	834	805	776	748	719	690
	High	1261	1227	1194	1161	1128	1095	1062	1028	995	962	929
07	Low	1128	1095	1062	1028	995	962	929	896	863	829	796
	High	1438	1409	1380	1351	1323	1294	1265	1236	1208	1179	1150
08	Low	771	751	731	710	690	670	649	629	609	589	568
	High	1015	994	974	954	934	913	893	873	852	832	812
09	Low	771	751	731	710	690	670	649	629	609	589	568
	High	1015	994	974	954	934	913	893	873	852	832	812
12	Low	893	873	852	832	812	791	771	751	731	710	690
	High	1055	1035	1015	994	974	954	934	913	893	873	852
14	Low	893	873	852	832	812	791	771	751	731	710	690
	High	1055	1035	1015	994	974	954	934	913	893	873	852

*Approximate fan rpm shown, based on 1725 rpm motor.

NOTE: Factory speed setting is at 5 turns open.

Fan RPM at Motor Pulley Settings* – 48PM16–28

UNIT 48PM		DRIVE	MOTOR PULLEY TURNS OPEN												
			0	1/2	1	1–1/2	2	2–1/2	3	3–1/2	4	4–1/2	5	5–1/2	6
PM16, 20 and 24 (230 and 460 volt)	Vertical	Low	685	706	727	749	770	791	812	833	854	876	897	918	939
		Mid–Low	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
		Mid–High	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
		High	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Horizontal	Low	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Mid–Low	896	924	951	979	1006	1034	1062	1089	1117	1144	1172	1199	1227
		Mid–High	1113	1138	1163	1188	1213	1238	1264	1289	1314	1339	1364	1389	1414
		High	1096	1116	1137	1157	1177	1197	1218	1238	1258	1278	1299	1319	1339
PM16, 20 and 24 (575 volt)	Vertical	Low	751	768	785	802	819	836	853	869	886	903	920	937	954
		Mid–Low	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
		Mid–High	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
		High	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Horizontal	Low	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Mid–Low	873	893	912	932	951	971	991	1010	1030	1049	1069	1088	1108
		Mid–High	1113	1138	1163	1188	1213	1238	1264	1289	1314	1339	1364	1389	1414
		High	1096	1116	1137	1157	1177	1197	1218	1238	1258	1278	1299	1319	1339
28 (all voltages)	Vertical	Low	687	703	718	734	749	765	780	796	811	827	842	858	873
		Mid–Low	805	822	839	856	872	889	906	923	940	957	973	990	1007
		Mid–High	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
		High	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Horizontal	Low	687	703	718	734	749	765	780	796	811	827	842	858	873
		Mid–Low	805	822	839	856	872	889	906	923	940	957	973	990	1007
		Mid–High	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
		High	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297

LEGEND

n/a – not available

* Approximate fan rpm shown.

NOTE: Factory pulley speed setting is at 3 turns open.

Fan RPM at Motor Pulley Settings* – 50PM16–28

50PM	DRIVE	MOTOR PULLEY TURNS OPEN												
		0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
PM16, 20 and 24 (230 and 460 volt)	Low Range Vertical	685	706	727	749	770	791	812	833	854	876	897	918	939
	Mid-Low Range Vertical	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Vertical	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Vertical	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Low Range Horizontal	685	706	727	749	770	791	812	833	854	876	897	918	939
	Mid-Low Range Horizontal	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Horizontal	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Horizontal	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
PM16, 20 and 24 (575 Volt)	Low Range Vertical	751	768	785	802	819	836	853	869	886	903	920	937	954
	Mid-Low Range Vertical	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Vertical	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Vertical	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Low Range Horizontal	751	768	785	802	819	836	853	869	886	903	920	937	954
	Mid-Low Range Horizontal	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Horizontal	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Horizontal	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
28 (all voltages)	Low Range Vertical	687	703	718	734	749	765	780	796	811	827	842	858	873
	Mid-Low Range Vertical	805	822	839	856	872	889	906	923	940	957	973	990	1007
	Mid-High Range Vertical	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Vertical	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Low Range Horizontal	687	703	718	734	749	765	780	796	811	827	842	858	873
	Mid-Low Range Horizontal	805	822	839	856	872	889	906	923	940	957	973	990	1007
	Mid-High Range Horizontal	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Horizontal	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297

* Approximate fan rpm shown, based on 1725 rpm motor.

NOTE: Factory pulley speed setting is at 3 turns open.

Accessory/FIOP Pressure Drop (in. wg) — 48/50PG03-07

AIRFLOW (CFM)	ELECTRIC HEAT (Sizes 03-07)	ECONOMIZER (Vertical) (Sizes 03-07)	ECONOMIZER (Horizontal) (Sizes 03-07)	Humidi–MiZer™ SYSTEM (Sizes 03-04)	Humidi–MiZer™ SYSTEM (Sizes 05-07)
600	0.01	0.01	0.03	0.01	—
800	0.01	0.01	0.05	0.02	—
1000	0.02	0.02	0.07	0.03	—
1200	0.02	0.03	0.10	0.04	0.02
1400	0.03	0.04	0.14	0.04	0.03
1600	0.04	0.06	0.17	0.05	0.03
1800	0.05	0.07	0.22	—	0.04
2000	0.07	0.09	0.26	—	0.04
2200	0.08	0.11	0.31	—	0.05
2400	0.10	0.13	0.37	—	0.06
2600	0.11	0.15	0.43	—	0.06
2800	0.13	0.18	0.49	—	0.07
3000	0.15	0.21	0.56	—	0.08

Accessory/FIOP Pressure Drop (in. wg) — 48/50PG08-14

AIRFLOW (CFM)	ELECTRIC HEAT	ECONOMIZER (Vertical)	ECONOMIZER (Horizontal)	Humidi–MiZer™ SYSTEM
2250	0.03	0.05	0.10	0.03
2650	0.05	0.06	0.13	0.03
3050	0.06	0.08	0.17	0.04
3450	0.08	0.09	0.21	0.05
3850	0.10	0.10	0.26	0.06
4250	0.12	0.12	0.31	0.07
4650	0.14	0.13	0.37	0.08
5050	0.17	0.15	0.44	0.09
5450	0.20	0.17	0.50	0.10
5850	0.23	0.18	0.58	0.11
6250	0.26	0.20	0.66	0.12

LEGEND

FIOP – Factory–Installed Option

***** The static pressure must be added to the external static pressure. The sum and the evaporator entering–air cfm should then be used in conjunction with the Fan Performance tables to determine blower rpm and watts.

Accessory/FIOP Static Pressure Drops (in. wg)* – 48/50PM16–28

CFM	Economizer	Humidi–MiZer™ (16, 20, 24)	Humidi–MiZer™ (28)
4000	0.02	0.17	–
4500	0.03	0.19	–
5000	0.04	0.21	–
5500	0.05	0.24	–
6000	0.06	0.27	–
6500	0.07	0.31	0.19
7000	0.08	0.35	0.21
7500	0.09	0.39	0.23
8000	0.1	0.43	0.26
8500	0.11	0.48	0.29
9000	0.12	0.52	0.31
9500	0.13	0.57	0.34
10000	0.15	0.62	0.37
10500	0.16	–	0.4
11000	0.17	–	0.43
11500	0.19	–	0.46
12000	0.2	–	0.5

LEGEND

FIOP – Factory–Installed Option

* The static pressure must be added to the external static pressure. The sum and the evaporator entering–air cfm should then be used in conjunction with the Fan Performance tables to determine blower rpm and watts.

Accessory/FIOP Electric Heat Static Pressure Drop (in. wg) – 50PM16–28

CFM	Nominal Heater Size (kw)	Pressure Drop (in. wg)	Nominal Heater Size (kw)	Pressure Drop (in. wg)	Nominal Heater Size (kw)	Pressure Drop (in. wg)
4800	25	0.01	50	0.02	75	0.03
5000		0.01		0.02		0.04
6000		0.02		0.04		0.06
7000		0.03		0.06		0.08
8000		0.04		0.08		0.12
9000		0.05		0.1		0.15
10000		0.06		0.13		0.2
11500		0.09		0.18		0.27

LEGEND

FIOP – Factory–Installed Option

NOTES:

1. Heaters are rated at 240v, 480v, and 600v.
2. The static pressure must be added to the external static pressure. The sum and the evaporator entering–air cfm should then be used in conjunction with the Fan Performance tables to determine blower rpm, bhp, and watts.

 Printed in U.S.A. Edition Date: 1/11 **Catalog No:48–50PGPM–03T**

Replaces: 48–50PGPM–02T

CONTROL SET POINT AND CONFIGURATION LOG

Model Number: _____ Software Versions: _____

Serial Number: _____ MBB: CESR131320−− _ _

Date: _____ ECB: CESR131249−− _ _

Technician: _____ MARQ: CESR131171−− _ _

INDICATE UNIT SETTINGS BELOW

Control Type: Thermostat/T55 Space Temp./T−56 Space Temp./T−58 Space Temp.

Set Points: Cooling Occupied: _____ Unoccupied: _____

Heating Occupied: _____ Unoccupied: _____

MODE — CONFIGURATION

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
CONFIGURATION					SERVICE CONFIGURATION		14
DISP	Display Configuration				DISPLAY		14
METR	Metric Display	Off/On		Off		DISPUNIT	14
LANG	Language Selection	0=English 1=Spanish 2=French 3=Portuguese		0		LANGUAGE	14
PROT	Password Enable	Disable/Enable		Enable		PASS_EBL	14
PSWD	Service Password	0000 to 9999		1111		PASSWORD	14
TEST	Test Display LEDs	Off/On		Off	(display only, not in table)	DISPTEST	14
UNIT	Unit Configuration				UNIT		14
S.DLY	Startup Delay	10 to 600	sec	30		STARTDLY	14
U.CTL	Unit Control Type	2=Thermostat 3=Space Sensor		2		CTL_TYPE	14
T.CTL	Thermostat Control Type	0=Adaptive 1=1 Stage Y1 2=2 Stage Y1 3=Digital		0		STATTYPE	15
OC.FN	Fan On When Occupied	No/Yes		Yes		OCC_FAN	15
IDF.F	Shut Down on IDF Failure	No/Yes		Yes		FATALFAN	15
FN.SW	Fan Status Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		FANSTCFG	15
FL.SW	Filter Status Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		FILSTCFG	15
FS.SW	Fire Shutdown Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		SHTDNCFG	15
RM.SW	Remote Occupancy Switch	0=No Switch 1=Normal Open 2=Normal Closed		0		REMOCCFG	15
SAT.T	SAT Settling Time	10 to 900	sec	240		SAT_SET	15
RAT.S	RAT Sensor on SPTO Input	No/Yes		No		RAT_SPTO	15
RH.S	RH Sensor on OAQ Input	No/Yes		No		RH_OAQ	15
RH.SW	Space Humidity Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no Humidi-MiZer FIOP 1: Humidi-MiZer FIOP		HUMSTCFG	15
TCS.C	Temp Cmp Strt Cool Factr	0 to 60	mins	0		TCSTCOOL	15
TCS.H	Temp Cmp Strt Heat Factr	0 to 60	mins	0		TCSTHEAT	15

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB—TABLE	CCN POINT	PAGE NO.
COOL	Cooling Configuration				COOL_CFG		15
N.CIR	Number of Circuits	0 to 3		1 (03-07) 2 (08-14) 3 (PG16) 2 (20-28, PM16)		NUM_CIRC	19
N.A	Compressors on Circuit A	1 to 2		1 (PG03-24) 1 (PM(16-28) 2 PG(28)		A_COMPS	19
MRT.C	Compressor Min On Time	120 to 999	sec	180		MIN_ON	19
MOT.C	Compressor Min Off Time	300 to 999	sec	300		MIN_OFF	19
RST.C	Runtime to Reset Strikes	120 to 999	sec	300		MIN_ON_S	37
C.DEC	Cool Stage Decrease Time	120 to 999	sec	300		STAGEDEC	18
C.INC	Cool Stage Increase Time	120 to 999	sec	450		STAGEINC	18
FOD.C	Fan-off Delay, Mech Cool	0 to 600	sec	60		COOL_FOD	18
ALM.N	Alert Each Strike	No/Yes		Yes		ALM_NOW	17
SAT	Supply Air Temperature						37
SA.PD	SAT Cool Demand (+) Level	0.5 to 10	^F	1		SAT_POS	21
SA.ND	SAT Cool Demand (-) Level	-10 to -0.5	^F	-1		SAT_NEG	
SAT.U	Minimum SAT Upper Level	35.0 to 65.0	°F	60 (PG03-16) 58 (PG 20-24)(PM 16-28) 53 (PG 28)		SATMIN_H	
SAT.L	Minimum SAT Lower Level	35.0 to 65.0	°F	35 (03-07) 45 (08-14) 50 (PG16) 48 (20-28, PM16)		SATMIN_L	
SPT	Space Temperature						16
CL.PD	SPT Cool Demand (+) Level	0.5 to 5	^F	1		DEM_POS	
CL.ND	SPT Cool Demand (-) Level	-5 to -0.5	^F	-1		DEM_NEG	
C.LAG	Cool Thermal Lag Factor	0 to 5		1		COOL_LAG	
CIR.A	Circuit A						19
CA.LO	Circuit A Lockout Temp	0 to 100F	°F	0		OATLCMPA	
CS.A1	Current Sensing A1	Disable/Enable		Disable (1-phase) Enable (3-phase)		A1_SENSE	
CS.A2	Current Sensing A2	Disable/Enable		Disable (03-24) Enable (PG 28)		A2_SENSE	
A1.FN	Level 1 Fans A	0 to 7		no Humidi-MiZer FIOP: 1 (03-24)(PM 28) 5 (PG 28) Humidi-MiZer FIOP: 0 (PG03-16) 1 (20-28, PM16)		CIR_A_1	
A2.FN	Level 2 Fans A	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (08-20) 2 (24-28) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20, PM16) 2 (24-28)		CIR_A_2	
A3.FN	Level 3 Fans A	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (08-24)(PM 28) 7 (PG 28) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20-28, PM16)		CIR_A_3	
CIR.B	Circuit B						19
CB.LO	Circuit B Lockout Temp	0 to 100F	°F	0: no Humidi-MiZer FIOP Humidi-MiZer FIOP: 40 (PG08-16) 0 (20-28, PM16)(03-07)		OATLCMPB	
CS.B1	Current Sensing B1	Disable/Enable		Disable (03-07) Enable (08-28)		B1_SENSE	
B1.FN	Level 1 Fans B	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 1 (PG08-16) 4 (20-28, PM16) Humidi-MiZer FIOP: 0 (PG03-16) 1 (20-28, PM16)		CIR_B_1	

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
COOL (cont)	Cooling Configuration				COOL_CFG		15
B2.FN	Level 2 Fans B	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (PG08-16) 6 (20, PM16) 2 (24-28) Humidi-Mizer FIOP: 0 (03-14) 1 (PG16) 3 (20, PM16) 2 (24-28)		CIR_B_2	
B3.FN	Level 3 Fans B	0 to 7		no Humidi-MiZer FIOP: 0 (03-07) 3 (PG08-16) 6 (20-28, PM16) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20-28, PM16)		CIR_B_3	
CIR.C	Circuit C						19
CC.LO	Circuit C Lockout Temp	0 to 100F	°F	0		OATLCMPC	
CS.C1	Current Sensing C1	Disable/Enable		Disable (03-14, 20-28) Enable (PG16)		C1_SENSE	
C1.FN	Level 1 Fans C	0-7		no Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 0 (20-28, PM16) Humidi-MiZer FIOP: 0 (PG03-16) 1 (20-28, PM16)		CIR_C_1	
C2.FN	Level 2 Fans C	0 to 7		no Humidi-MiZer FIOP: 0 (03-14) 3 (PG16) 0 (20-28, PM16) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 2 (20-28, PM16)		CIR_C_2	
C3.FN	Level 3 Fans C	0 to 7		no Humidi-MiZer FIOP: 0 (03-14) 3 (PG16) 0 (20-28, PM16) Humidi-MiZer FIOP: 0 (03-14) 1 (PG16) 3 (20-28, PM16)		CIR_C_3	
SST	Low Suction Control						39
SST.O	Suction OK Temperature	10 to 50	°F	18		SSTOK	
SST.1	Low Suction - Level 1	10 to 50	°F	20		SSTLEV1	
SST.2	Low Suction - Level 2	5 to 50	°F	15		SSTLEV2	
SST.3	Low Suction - Level 3	0 to 50	°F	10		SSTLEV3	
CK.DL	Delay On Low SST Check	0 to 300	sec	0		SSTCKDLY	
OFC	Outdoor Fan Control						19
OFC.3	OFC3 Enable. CCH Disable	No/Yes		No (PG03-16) Yes (20-28, PM16)		OFC3_CTL	
0.MXP	Fan Lev0 Max Pressure	100 to 500	psig	200		LEV0MAXP	
1.MXP	Fan Lev1 Max Pressure	100 to 500	psig	400 (PG03-16) 450 (20-28, PM16)		LEV1MAXP	
2.MNP	Fan Lev2 Min Pressure	100 to 500	psig	150 (PG03-16) 200 (20-28, PM16)		LEV2MINP	
2.ON	Fan Lev2 On Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 55 (03-20) 45 (24-28) Humidi-MiZer FIOP: 68 (20, PM16) 61 (24-28)(PG03-16)		LEV2ON	
2.OFF	Fan Lev2 Off Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 45 (PG03-16) 50 (20, PM16) 40 (24-28) Humidi-MiZer FIOP: 57 (20-28, PM16)(PG03-16)		LEV2OFF	
2.MXP	Fan Lev2 Max Pressure	100 to 500	psig	400		LEV2MAXP	
3.MNP	Fan Lev3 Min Pressure	100 to 500	psig	250		LEV3MINP	

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
COOL (cont)	Cooling Configuration				COOL_CFG		
3.ON	Fan Lev3 On Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 65 Humidi-MiZer FIOP: 88 (20, PM16) 68 (24-28)(PG03-16)		LEV3ON	
3.OFF	Fan Lev3 Off Temperature	0 to 100	°F	no Humidi-MiZer FIOP: 55 Humidi-MiZer FIOP: 78 (20, PM16) 62 (24-28)(PG03-16)		LEV3OFF	
HMZR	Humidimizer Config				HMZR_CFG		24
REHT	Humidimizer Equipped	No/Yes		No: no Humidi-MiZer FIOP Yes: Humidi-MiZer FIOP		REHEAT	24
R.DEC	Reheat2 Stage Decr. Time	0 to 999	secs	60		RSTAGDEC	28
R.INC	Reheat2 Stage Incr. Time	0 to 999	secs	300		RSTAGINC	28
RH.FN	Reheat Fan Control	No/Yes		No (03-14) Yes (16-28)		RHFANCTL	28
RF.LV	Reheat ODF Fan On Level	0 to 3		2 (03-20) 3 (24-28)		RHFANLEV	28
RF. ON	Reheat ODF Fan On Temp	0 to 100	°F	75 (PG03-16) 93 (PG20-24)(PM16-28) 85 (PG 28)		RHFANON	28
RF.OF	Reheat ODF Fan Off Temp	0 to 100	°F	70 (PG03-16) 83 (20, PM16) 88 (24)(PM 28) 80 (PG 28)		RHFANOFF	28
RA.LO	Reheat2 OAT Limit A	20 to 70	°F	40		OATLRH_A	28
RA.LP	Reheat2 SSP Lo Limit A	50 to 100	psig	80		RHSSPL_A	28
RA.HP	Reheat2 SSP Hi Limit A	50 to 100	psig	90		RHSSPH_A	28
RB.LO	Reheat2 OAT Limit B,C	20 to 70	°F	50		OATLRH_B	28
RB.LP	Reheat2 SSP Lo Limit B,C	50 to 100	psig	80		RHSSPL_B	28
RB.HP	Reheat2 SSP Hi Limit B,C	50 to 100	psig	90		RHSSPH_B	28
HEAT	Heating Configuration				HEAT_CFG		15
HT.TY	Type of Heat Installed	0=No Heat 1=Gas 2=Electric		0 (50 series with no electric heat) 1 (48 series) 2 (50 series with electric heat)		HEATTYPE	21
N.HTR	Number of Heat Stages	1 to 2		1 (48 series 1-phase, 50 series <15kW) 2 (48 series 3-phase, 50 series >=15kW)		NUM_HEAT	22
MRT.H	Heat Minimum On Time	60 to 999	sec	120		HMIN_ON	22
MOT.H	Heat Minimum Off Time	60 to 999	sec	120		HMIN_OFF	22
H.DEC	Heat Stage Decrease Time	120 to 999	sec	300		HSTAGDEC	21
H.INC	Heat Stage Increase Time	120 to 999	sec	450		HSTAGINC	21
FOD.E	Fan-off Delay, Elect Heat	10 to 600	sec	30		ELEC_FOD	17
FOD.G	Fan-off Delay, Gas Heat	45 to 600	sec	45		GAS_FOD	17
HT.LO	Heating Lockout Temp	40 to 125	°F	75		OATLHEAT	21
SAT							15
SAT.H	SAT Heat Mode Sensing	Disable/Enable		Disable		SAT_HEAT	
SAM.L	Maximum SAT Lower Level	85 to 200	°F	140		SATMAX_L	
SAM.U	Maximum SAT Upper Level	85 to 200	°F	160		SATMAX_H	
SPT	Space Temperature						16
HT.PD	SPT Heat Demand (+) Level	0.5 to 5	^F	1		HDEM_POS	
HT.ND	SPT Heat Demand (-) Level	-5 to -0.5	^F	-1		HDEM_NEG	
H.LAG	Heat Thermal Lag Factor	0 to 5		1		HEAT_LAG	

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
ECON	Economizer Configuration				ECON_CFG		23
EC.EN	Economizer Installed	No/Yes		No: no FIOP Yes: FIOP		ECONO	23
E.CTL	Economizer Control Type	1=Dig/Position 2=Dig/Command 3=Analog Ctrl		1		ECON_CTL	14
EC.MN	Econo Minimum Position	0 to 100	%	30 0: ERV FIOP		ECONOMIN	23
EC.MX	Econo Cool Max Position	0 to 100	%	100		ECONOMAX	23
M.ANG	Min Actuator Ctrl Angle	75 to 90		88		MINANGLE	23
EH.LO	Econo Cool Hi Temp Limit	40 to 100	°F	65		OATLECLH	23
EL.LO	Econo Cool Lo Temp Limit	-30 to 50	°F	0		OATLECLL	23
DF.DB	Diff Dry Bulb Control	Disable/Enable		Disable		DIFFBULB	23
UEFC	Unoccupied Free Cooling	0=Disabled 1=Unocpied 2=PreOccupancy		2		UEFC_CFG	23
FC.TM	Free Cool PreOcc Time	1 to 9999	mins	120		UEFCTIME	23
FC.LO	Free Cool Low Temp Limit	-30 to 70	°F	50		OATLUEFC	23
PE.EN	Power Exhaust Installed	No/Yes		No: no FIOP Yes: FIOP		PE_ENABL	24
PE.1	PE Stage1 Econo Position	0 to 100	%	40		PE1_POS	24
PE.2	PE Stage2 Econo Position	0 to 100	%	75		PE2_POS	24
EN.SW	Enthalpy Switch	0=No Switch 1=Normal Open 2=Normal Closed		0: no FIOP 1: FIOP		ENTHLCFG	10
E.TRV	Economizer Travel Time	5 to 300	secs	150		ECONOTRV	104
E.MXB	Bottom Stage Max Econo	0 to 100	%	50		ECONMAXB	104
E.MXM	Middle Stage Max Econo	0 to 100	%	35		ECONMAXM	104
E.MXT	Top Stage Max Econo	0 to 100	%	25 (PG03-16) 0 (20-28, PM16)		ECONMAXT	104
AIR.Q	Air Quality Config.				IAQ_CFG		14
IA.CF	IAQ Analog Input Config	0=No IAQ 1=DCV 2=Override IAQ 3=Ctrl Min Pos		0: no FIOP 1: FIOP		IAQANCFG	14
IA.FN	IAQ Analog Fan Config	0=Never 1=Occupied 2=Always		0		IAQANFAN	30
II.CF	IAQ Switch Input Config	0=No IAQ 1=DCV N/O 2=DCV N/C 3=Override N/O 4=Override N/C		0		IAQINCFG	30
II.FN	IAQ Switch Fan Config	0=Never 1=Occupied 2=Always		0		IAQINFAN	34
AQ.MN	Econo Min IAQ Position	0 to 100	%	10 0: ERV FIOP		IAQMINP	30
EC.MN	Econo Minimum Position	0 to 100	%	30 0: ERV FIOP		ECONOMIN	23
OVR.P	IAQ Override Position	0 to 100	%	100		IAQOVPOS	30
OA.CF	OAQ Analog Input Config	0=No OAQ 1=DCV 2=Lockout OAQ		0		OAQANCFG	30
OAQ.L	OAQ Lockout Limit	0 to 5000		600		OAQLOCK	30
AQD.L	AQ Differential Low	0 to 5000		100		DAQ_LOW	30
AQD.H	AQ Differential High	0 to 5000		700		DAQ_HIGH	30
DF.ON	Fan On AQ Differential	0 to 5000		600		DAQFNON	34
DF.OF	Fan Off AQ Differential	0 to 5000		200		DAQFNOFF	34
I.4M	IAQ Sensor Value at 4mA	0 to 5000		0		IAQ_4MA	30
I.20M	IAQ Sensor Value at 20mA	0 to 5000		2000		IAQ_20MA	30
O.4M	OAQ Sensor Value at 4mA	0 to 5000		0		OAQ_4MA	33
O.20M	OAQ Sensor Value at 20mA	0 to 5000		2000		OAQ_20MA	33
H.4M	RH Sensor Value at 4mA	0 to 50	%	0		RH_4MA	24
H.20M	RH Sensor Value at 20mA	60 to 100	%	100		RH_20MA	24

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB—TABLE	CCN POINT	PAGE NO.
OAU	Outside Air Unit Config				OAU_CFG		12
OA.TY	Outdoor Air Unit Type	0=No OAU 1=ERV Module 2=Economizer 3=Pwr Exhaust 4=OA Monitor 5=100% OA Unit 6=EXv1 ERV		0: no FIOP 1: FIOP EXv2		OAU_TYPE	40
OA.FC	Outside Air Fan Curve	0 to 999		0: no FIOP 1: PG03-07 1ph low CFM ERV 2: PG03-07 3ph low CFM ERV 3: PG03-07 1ph high CFM ERV 4: PG03-07 3ph high CFM ERV 5: PG08-14 low CFM ERV 6: PG08-14 high CFM ERV 7: PM16-24 low CFM ERV 8: PM16-24 high CFM ERV 9: PM28 low CFM ERV 10: PM28 high CFM ERV		OAFANCRV	105
PE.FC	Exhaust Air Fan Curve	0 to 999		0: no FIOP 1: PG03-06 1ph low CFM ERV 2: PG03-07 3ph low CFM ERV 3: PG03-06 1ph high CFM ERV 4: PG03-07 3ph high CFM ERV 5: PG08-14 low CFM ERV 6: PG08-14 high CFM ERV 7: PM16-24 low CFM ERV 8: PM16-24 high CFM ERV 9: PM28 low CFM ERV 10: PM28 high CFM ERV		PEFANCRV	105
U.RUN	OAU Unoccupied Operation	No/Yes		NO		UNOCCRUN	105
OAU.F	Shut Down on Fan Failure	No/Yes		Yes		FATALOAU	105
M.WHL	Modulating Wheel Install	No/Yes		NO		MODWHEEL	105
OA.MN	Minimum Outside Air CFM	0 to 32000	CFM	375: PG03-07 low CFM ERV 800: PG03-07 high CFM ERV 1000: PG08-14 low CFM ERV 2500: PG08-14 high CFM ERV 3000: PM16-28 low CFM ERV 4000: PM16-24 high CFM ERV 5000: PM28 high CFM ERV		MINOACFM	95
DCV.M	Min DCV Outside Air CFM	0 to 32000	CFM	100: PG03-07 ERV 250: PG08-14 low CFM ERV 600: PG08-14 high CFM ERV 1000: PM16-24 low CFM ERV 1500: PM16-24 high CFM ERV, PM28 low CFM ERV 2000: PM28 high CFM ERV		MINDCVSP	95
PEX.C	Power Exhaust Control	0=Offset CFM 1=BP		0		PEX_CTL	105
PE.OF	Power Exhaust CFM Offset	-17000 to 17000	CFM	-200		EXOFFSET	95
BP.SP	Building Pressure Setpnt	-0.25 to 0.25	in H2O	0.05		OAU_BPSP	95
OA.TM	Outside Air Tempering	Disable/Enable		Disable		OATEMPER	95
TM.LO	OA Tempring Lockout Temp	0 to 80	°F	60		OATMPLOC	95
TM.SP	OA Tempring SAT Setpoint	35 to 80	°F	55		OATMPSPT	95
OAC.K	Outside Air CFM k Factor	0.8 to 1.2		1.0		OACFM_K	105
EXC.K	Exhaust Air CFM k Factor	0.8 to 1.2		1.0		EXCFM_K	105

MODE — CONFIGURATION (cont)

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB−TABLE	CCN POINT	PAGE NO.
A.FAN	Adaptive Fan				AFAN_CFG		34
AF.EN	Adaptive Fan Operation	No/Yes		No		ADAPTFAN	34
FS.VN	Fan Speed - Ventilation	0 to 100	%	50		FSPDVENT	34
FS.AQ	Fan Speed - IAQ Override	0 to 100	%	50		FSPDAQOR	34
FS.E1	Fan Speed - Free Cool Lo	0 to 100	%	60		FSPDECO1	34
FS.E2	Fan Speed - Free Cool Hi	0 to 100	%	90		FSPDECO2	34
FS.CL	Fan Speed - Mech Cooling	60 to 100	%	100		FSPDCOOL	34
FS.HT	Fan Speed - Heating	65 to 100	%	100		FSPDHEAT	34
FS.RH	Fan Speed - Reheat2	65 to 100	%	100		FSPDREHT	34
ALM.O	Alarm Relay Config.				ALM_CFG		37
A.SPC	SPT/SPRH Sensor Failure	No/Yes		Yes		SPACE_AL	106
A.SRT	SAT/RAT Sensor Failure	No/Yes		Yes		SATRATAL	106
A.OAT	OAT Thermistor Failure	No/Yes		Yes		OAT_AL	106
A.CS	Current Sensor Failure	No/Yes		Yes		CS_AL	105
A.CMP	Compressor Failure	No/Yes		Yes		COMP_AL	106
A.CKT	Refrig Circuit Failure	No/Yes		Yes		CKT_AL	106
A.SSP	SSP Transducer Failure	No/Yes		Yes		SSP_AL	106
A.SCT	SCT Thermistor Failure	No/Yes		Yes		SCT_AL	106
A.FAN	Indoor Fan Failure	No/Yes		Yes		FAN_AL	34
A.FIL	Dirty Filter	No/Yes		Yes		FILT_AL	37
A.TST	Thermostat Failure	No/Yes		Yes		TSTAT_AL	106
A.ECO	Economizer Failure	No/Yes		Yes		ECON_AL	106
PID	PID Configurations				PID_CFG		37
EC.P	Economizer PID - kP	0.00 to 99.90		2.5		ECONO_P	106
EC.I	Economizer PID - kI	0.00 to 99.90		0.12		ECONO_I	106
EC.D	Economizer PID - kD	0.00 to 99.90		1		ECONO_D	106
EC.DT	Economizer PID - rate	10.00 to 180.00	secs	15		ECONO_DT	106
EC.DB	Economizer PID Deadband	0 to 25	%	3		ECONBAND	106
LK.P	Linkage Staging PID - kP	0.00 to 99.90		10		LINK_P	106
LK.I	Linkage Staging PID - kI	0.00 to 99.90		5		LINK_I	106
LK.D	Linkage Staging PID - kD	0.00 to 99.90		5		LINK_D	106
LK.DT	Linkage Staging PID - rate	10.00 to 180.00	secs	30		LINK_DT	106
(GENERIC = CCN only)					GENERICS		96
	POINT 01 Definition					Point_01	
	POINT 02 Definition					Point_02	
	POINT 03 Definition					Point_03	
	POINT 04 Definition					Point_04	
	POINT 05 Definition					Point_05	
	POINT 06 Definition					Point_06	
	POINT 07 Definition					Point_07	
	POINT 08 Definition					Point_08	
	POINT 09 Definition					Point_09	
	POINT 10 Definition					Point_10	
	POINT 11 Definition					Point_11	
	POINT 12 Definition					Point_12	
	POINT 13 Definition					Point_13	
	POINT 14 Definition					Point_14	
	POINT 15 Definition					Point_15	
	POINT 16 Definition					Point_16	
	POINT 17 Definition					Point_17	
	POINT 18 Definition					Point_18	
	POINT 19 Definition					Point_19	
	POINT 20 Definition					Point_20	
TRIM	Sensor Calibration				(CCN TRIM - see Maintenance Display)		5
SPT.C	Space Temp Calibration	-30 to 130	°F				52
SPT.T	Space Temp Trim	-30 to 30	^F	0			52
SAT.C	Supply Air Temp Calib.	-30 to 130	°F				52
SAT.T	Supply Air Temp Trim	-30 to 30	^F	0			15
RAT.C	Return Air Temp Calib.	-30 to 130	°F				106
RAT.T	Return Air Temp Trim	-30 to 30	^F	0			106
CCN	CCN Configuration				CCN CONFIGURATION 4850PGPM		17
CCN.A	CCN Element Number	1 to 239		1		CCNADD	35
CCN.B	CCN Bus Number	0 to 239		0		CCNBUS	35
BAUD	CCN Baud Rate	1=2400 2=4800 3=9600 4=19200 5=38400		3		CCNBAUDD	35

ITEM	EXPANSION	RANGE	UNITS	DEFAULT	CCN TABLE/ SUB–TABLE	CCN POINT	PAGE NO.
BROD	CCN Broadcast Config.				BRODEFS		17
B.TIM	CCN Time/Date Broadcast	No/Yes		No		CCNBC	35
B.OAT	CCN OAT Broadcast	No/Yes		No		OATBC	35
B.GS	Global Schedule Broadcst	No/Yes		No		GSBC	17
B.ACK	CCN Broadcast Ack'er	No/Yes		No		CCNBCACK	36
SCH.O	CCN Schedule Overrides				SCHEDOVR		36
SCH.N	Schedule Number	0 = Always Occupied 1-64 = Local Schedule 65-99 = Global Schedule		0		SCHEDNUM	17
HOL.G	Accept Global Holidays	No/Yes		No		HOLIDAYT	36
OV.TL	Override Time Limit	0 to 4	hours	4		OTL	17
OV.EX	Timed Override Hours	0 to 4	hours			OVR_EXT	17
OV.SP	SPT Override Enabled	No/Yes		Yes		TIMEOVER	17
LDSH	CCN LOADSHED CONFIG.				LOADSHED		36
S.GRP	Loadshed Group Number	0 to 16		0		SHED_NUM	36
R.MXC	Redline Max Cool Stages	0 to 3		3		MAXCREDL	36
S.MXC	Loadshed Max Cool Stages	0 to 3		3		MAXCSHED	36
R.MXH	Redline Max Heat Stages	0 to 2		2		MAXHREDL	36
S.MXH	Loadshed Max Heat Stages	0 to 2		2		MAXHSHED	36

UNIT START-UP CHECKLIST

MODEL NO.:_____ SERIAL NO: _____

DATE:_____ TECHNICIAN: _____

I. PRE-START-UP:

☐ VERIFY THAT ALL PACKAGING MATERIALS HAVE BEEN REMOVED FROM UNIT
☐ VERIFY INSTALLATION OF OUTDOOR AIR HOOD
☐ VERIFY INSTALLATION OF FLUE EXHAUST AND INLET HOOD (48PG and PM ONLY)
☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
☐ VERIFY GAS PRESSURE TO UNIT GAS VALVE IS WITHIN SPECIFIED RANGE (48PG and PM ONLY)
☐ CHECK GAS PIPING FOR LEAKS (48PG AND 48PM)
☐ CHECK THAT INDOOR−AIR FILTERS ARE CLEAN AND IN PLACE
☐ CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
☐ VERIFY THAT UNIT IS LEVEL
☐ CHECK FAN WHEELS AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND VERIFY SETSCREW IS TIGHT
☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
☐ VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
☐ VERIFY INSTALLATION OF THERMOSTAT/SPACE SENSOR
☐ VERIFY CONFIGURATION VALUES FOR ELECTRONIC CONTROLS (REFER TO CONTROL SET UP CHECKLIST)
☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____	
COMPRESSOR AMPS — COMPRESSOR A1			L1	_____	L2	_____	L3 _____
—COMPRESSOR B1			L1	_____	L2	_____	L3 _____
ELECTRIC HEAT AMPS (IF EQUIPPED)			L1	_____	L2	_____	L3 _____
SUPPLY FAN AMPS	_____		L1	_____	L2	_____	L3 _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE	_____	F DB (Dry Bulb)	
RETURN-AIR TEMPERATURE	_____	F DB	F WB (Wet Bulb)
COOLING SUPPLY AIR	_____	F	
GAS HEAT SUPPLY AIR (48PG AND PM)	_____	F	
ELECTRIC HEAT SUPPLY AIR (50PG AND PM)	_____	F	

PRESSURES

GAS INLET PRESSURE		_____	IN. WG			
GAS MANIFOLD PRESSURE	STAGE NO. 1	_____	IN. WG	STAGE NO. 2	_____	IN. WG
REFRIGERANT SUCTION	CIRCUIT A	_____	PSIG	CIRCUIT A Superheat	_____	degF
	CIRCUIT B	_____	PSIG	CIRCUIT B Superheat		degF
REFRIGERANT DISCHARGE	CIRCUIT A	_____	PSIG	CIRCUIT A Subcooling	_____	degF
	CIRCUIT B		PSIG	CIRCUIT B Subcooling		degF

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

GENERAL

☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS

Catalog No:48−50PGPM−03T

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

Replaces: 48−50PGPM−02T